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[Home](#) > [Country Analysis Briefs](#) > [Germany Country Analysis](#)[PDF version](#) | [PDB version](#)

Brief

*December 2001*

[Background](#) | [Oil](#) | [Natural Gas](#) | [Coal](#) | [Electricity](#) | [Environment](#) | [Profile](#)  
| [Links](#)

## Germany

*Germany is one of the world's largest energy consumers. Because it has limited indigenous energy resources (except for coal), Germany imports most of its energy. Although the country is a major coal producer, it is a net coal importer.*

*The information contained in this report is the best available as of December 2001 and is subject to change.*



## GENERAL BACKGROUND

Germany is one of the largest economies in the world, a founding member of the European Union (EU), a North Atlantic Treaty Alliance (NATO) member, and a member of the Group of Seven (G-7) industrialized nations. It joined the common European currency, the euro, on January 1, 1999, and Frankfurt is the seat of the European Central Bank. The German mark will disappear in the first few

months of 2002 as people trade in their marks for the new euro coins and currency.

Germany experienced slower economic growth during 2001 as compared to 2000, and may be on the verge of a slight contraction, according to a report published in October 2001 by Germany's top six economic research institutes. The events of September 11 had a negative effect on the entire world economy, and recent German government estimates are that growth in 2001 may be just 0.75%. In September, business confidence in Germany fell to its lowest level since 1993. Export-led growth has been diminished as the global economy, and that of the United States in particular, loses momentum. Unemployment, a major issue in German politics in recent years, has decreased slightly since its high point in 1998. However, the current economic slowdown indicates that unemployment likely will not fall any further in the next 12 months.

## Energy in Germany

Germany has relatively insignificant domestic energy sources and is heavily import-reliant to meet its energy needs. Coal accounted for 47% of domestic energy production in 1999, nuclear power 30%, natural gas 14%, renewable sources (including hydro) 6%, and oil 2%. However, oil accounted for 41% of consumption.

Energy policy in Germany is influenced heavily by EU regulations. The EU requires privatization and competition in member countries' energy markets, and Germany has been a leader in developing competitive energy markets.

Following reunification of the country in 1990, the major task of German energy policy was to merge successfully the radically different energy sectors of the East and West. West Germany had a diversified and mainly privately-owned system of energy supply with a high standard of energy efficiency and a commitment to environmental protection. In contrast, East Germany's energy sector was highly centralized, predominantly state-owned, and mainly dependent upon relatively "dirty" lignite (brown coal) as its primary fuel. To date, a great deal of progress has been made in conforming the former East Germany's energy sector to the standards of the West in the areas of privatization and environmental regulation.

## OIL

Germany consumed about 2.8 million barrels per day (bbl/d) of oil in 2000, nearly all of which it imported, making Germany the third-largest oil importer in the world. German oil imports in 2000 came primarily from Russia (29%), Norway (18%), United Kingdom (13%), and the Libya (11%). German imports from Russia have remained unchanged in recent years. However, OPEC's share of German imports has decreased, while the share of North Sea oil from Norway and the United Kingdom has increased. For the first six months of 2001, preliminary estimates show Russian crude oil maintaining the same level as 2000, but imports from OPEC declining from 26% to 22% of total imports into Germany.

Germany produced around 64,000 bbl/d of crude oil in 2000, of which 16,000 bbl/d came from the German North Sea. Higher world oil prices in 2000 spurred a small increase in domestic crude oil production. Veba Oel is Germany's largest upstream company, with interests in 13 countries, including Germany, and production of about 160,000 barrels of oil equivalent per day.

Germany's oil consumption was essentially unchanged in 2000 as compared to 1999. With the aid of hefty federal taxes on gasoline consumption, Germany had decreased its oil consumption in recent years, with lower consumption in 1999 than in any year since unification. For instance, Germans pay about four times more for motor gasoline than Americans, despite having the most competitive retail gasoline market in Europe. German refinery throughput increased 1% in 2000, and refinery capacity utilization was at 95%.

The German downstream sector is in the process of completing two large mergers. In April 2001, Royal Dutch Shell and one of Germany's largest energy companies, RWE, agreed to form a new 50:50 venture called Shell & Dea Oil. The new company is managed by Shell, and in 2004 Shell's share will increase to 51%, and Shell will have the option to buy the remaining 49%, which it is expected to do. The new company will have about a 23% market share for gasoline stations and is poised to become Germany's largest refinery operation with capacity of about 460,000 bbl/d. However, in July 2001, BP acquired a majority stake (51%) in Veba Oel from E. On. Veba Oel, in addition to upstream assets valued at \$2 billion, owns the Aral network of gasoline stations, which has a 25% market share, and refinery capacity of about 300,000 bbl/d. In return, BP gave E. On a majority stake (51%) of its 25.5% holding (through holding company Gelsenberg) of German gas distributor Ruhrgas, \$1.63 billion in cash, and agreed to assume debts of \$950 million. BP and E. On have the option to acquire the remaining stakes in Veba and Gelsenberg, respectively. When the second deal was announced, both deals came under increasing scrutiny by EU and German officials. The European Commission has endorsed a preliminary finding of risk of "collective dominance" by the German cartel office, to which it has delegated

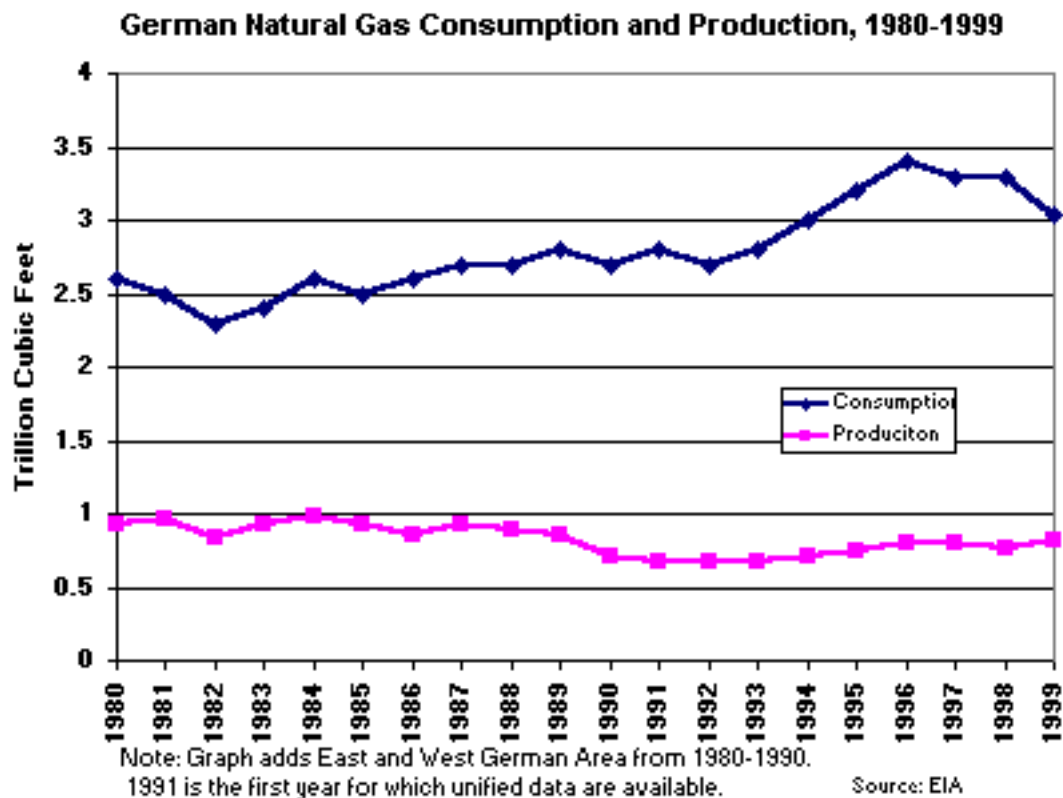
responsibility for assessing the downstream market effects. The European Commission is retaining responsibility for a 4-month investigation launched in late August on the effect of the mergers on the petrochemical industry.

## NATURAL GAS

Germany is the European Union's second largest consumer of natural gas, after the United Kingdom. Germany produces insufficient natural gas to satisfy domestic consumption and satisfies most of its demand through imports. In 1999, the country produced 0.82 trillion cubic feet (Tcf) of natural gas from proven reserves of 11.5 Tcf, while consuming 3.0 Tcf (a decline of 300 billion cubic feet (Bcf) from 1998). This decline appears to have continued into 2000, as natural gas import prices rose steadily, and German gas suppliers instead drew down stored natural gas that had been purchased at cheaper prices. Although overall natural gas consumption fell 1.2% from 1998 to 1999, power sector usage fell a much larger 7%. E. On, Germany's second-largest largest utility, has asserted that power sector usage of natural gas fell even further in 2000, as it became cheaper to import electricity and maximize output from coal-fired facilities. In 1999, residential and other non-commercial consumers accounted for 53% of total demand, industry for 38%, and power stations, 9%. In 2000, Russia provided 37% of Germany's consumption, the Netherlands 26%, Norway 14%, and Denmark 1%. Natural gas consumption accounted for about 21% of total energy consumption in Germany in 1999. This share is expected to rise over the decade, especially for electric power generation as nuclear power is phased out. In September 2000, the *Deutsches Nordseekonsortium* (German North Sea Consortium), which is made up of Wintershall (40%, operator), BEB Erdgas und Erdoel (40%), BASF (12%), and RWE-DEA (7%), began production. The first offshore natural gas project in the German North Sea, the field is located about 190 miles from the German coast. New pipelines will transmit the anticipated 3.3 million cubic meters (116.5 million cubic feet) per day of production. The field is expected to produce for 16 years.



Ruhrgas remains Germany's dominant natural gas transmission company, accounting for about 60% of all natural gas sales. Years of Ruhrgas's monopolistic control of Germany's natural gas market have left Germany with a highly developed



gas infrastructure. E. On, which already owns 42% of Ruhrgas through the deal with BP mentioned above and through E. On's partial ownership of another holding company of Ruhrgas, Bergemann, announced in November 2001, that it intends to buy the remaining shares of Bergemann, lifting E. On's share of Ruhrgas to 60%. E. On also sells to 35% of Germany's natural gas customers through its stakes in smaller companies Contigas and Thuga. E. On's ownership of Ruhrgas is already being investigated by the German cartel office, but perhaps more problematic is the fact that the outstanding shares of Bergemann are controlled by German coal group RAG, which is part-owned by E. On's rival company RWE. RWE may attempt to block the deal unless E. On gives RWE a larger share of RAG, of which E. On also is part-owner. Ruhrgas itself announced in October 2001, that it plans to bid for the gas division of Hungary's state-owned oil and gas group MOL.

Competition in Germany's natural gas market has developed slowly. Ruhrgas's main competitor, Wingas, was formed in 1993 by a joint venture between BASF's Wintershall (65%) and Russia's Gazprom (35%). Now, with its own domestic pipelines and links to export supply lines, Wingas has gained market share (19%), while Ruhrgas's share has decreased. Eni of Italy

and Energie Baden-Württemberg (EnBW) may also bring more competition to the German gas market through their partnered acquisition of a majority stake in Gasversorgung Süddeutschland (GVS). GVS currently gets 85% of its supply from Ruhrgas and 15% from Wingas, but the new Eni-EnBW holding company would likely have Eni supplying Libyan and Algerian gas to GVS. This acquisition of GVS is not yet certain, as there are remaining political and business obstacles.

Although Germany has one of the most liberalized energy sectors in the EU, full liberalization of the German natural gas market has not emerged as expected. According to EU law, member countries' natural gas transmission systems had to be open to third party access as of August 2000. While a German law was in place confirming a legal right for third party access, in practicality, new entrants have had difficulty gaining access. The creation of an independent regulator by the government is seen as key to making the market more accessible.

## Pipelines

Germany is both a major destination point and major transit center for Europe's natural gas pipelines. Germany has five major pipelines on land, three from the North Sea to its coast, and several in the construction and planning stages. Pipelines from the Czech Republic transport Russian natural gas. The existing pipelines include: 1) The MEGAL pipeline from the Czech Republic to France through Germany, with annual capacity of 777 billion cubic feet (Bcf), 2) the TENP pipeline from the Netherlands to Germany and onward to Switzerland and Italy, with an annual capacity of 247 Bcf, 3) the STEGAL pipeline from the Czech Republic to Germany, with an annual capacity of 283 Bcf, 4) the NETRA pipeline from Etzel/Wilhelmshaven to Steinitz/Bernau, with an annual capacity of 706 Bcf and 5) the MIDAL pipeline from the port of Emden to Ludwigshafen with an annual capacity of 459 Bcf. The pipelines that bring Norwegian natural gas ashore are Norpipe, which lands at Emden, and Europipe I & II, which land at Dornum. From the Dornum receiving station, the natural gas is linked to either the NETRA pipeline or the metering station at Emden, where the MIDAL pipeline begins.

The TENP pipeline can also bring in UK gas by way of the Netherlands. Wingas, which already owns the MIDAL and STEGAL pipelines, is planning to construct a pipeline with a capacity of 353-424 Bcf per year from Heppenheim in Southwest Germany to the states of Baden-Wurttemberg and Bavaria in Southeastern Germany. Ruhrgas is the largest shareholder in the MEGAL, TENP, and NETRA pipelines, though it has a majority stake only in the TENP pipeline. Ruhrgas, Fortum of Finland, and Wingas agreed in April 2001, to jointly develop plans to build a natural gas pipeline from Russia to Germany via the Baltic Sea.

The large volumes of natural gas entering Germany, particularly on the Northwest coast around Emden, have given rise to efforts to establish Europe's third major natural gas hub at Bunde near the Dutch border. This is the point where the pipeline system of Gasunie of the Netherlands links up to the German networks of Ruhrgas, Wingas, and BEB. Spot trading by about a dozen companies is already occurring in this area, although volumes are small so far. Its location is in close proximity to where very large volumes of natural gas come into Germany, combined with European Commission proposals to unbundle integrated gas companies in the EU make the formation of an important hub likely. A conference was held in May 2001, on the subject of fostering natural gas trade at Bunde, which was attended by 40 companies, including all of Germany's major players.

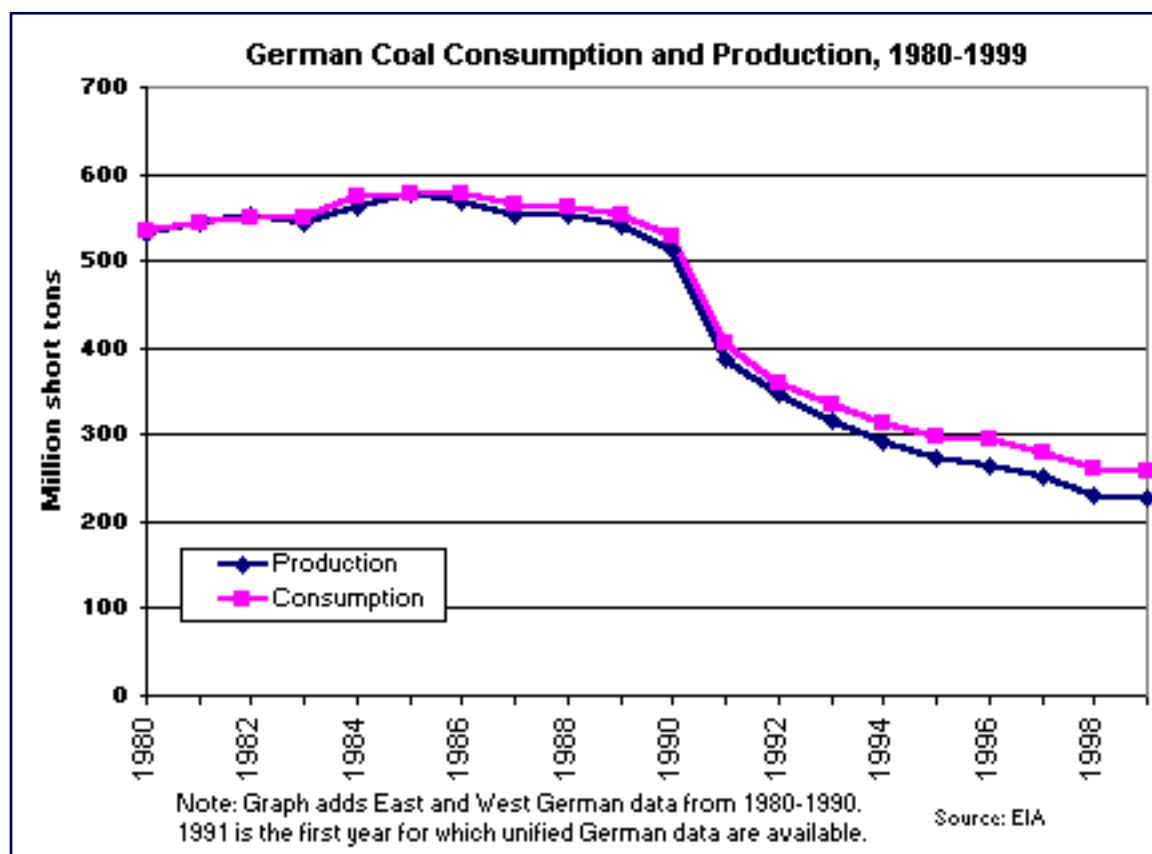
## **COAL**

Coal is Germany's only major domestic fuel source, accounting for 23% of energy consumption in 1999. Over 75% of German coal production is used for electricity generation, and coal accounts for over 50% of electricity generation. Hard coal production is expensive in Germany relative to other major coal producers, because German coal is located deep underground. Hard coal production has remained a viable industry only through heavy subsidization, which is being reduced, but not ended. Lignite, or "brown coal," production, however, is inexpensive in Germany. Germany is the world's largest lignite producer, with about one-fifth of global output, though output of lignite, most of which comes from the former East Germany, has



fallen by about 40% since reunification.

In March 1997, the German government, the mining industry, and the unions reached an agreement on the future structure of subsidies to the German hard coal industry. Subsidies to the industry are to be reduced from over DM10 billion (\$5.5 billion) in 1997 to DM5.5 billion (\$3 billion) by 2005. The agreement called for closure of 7-8 of Germany's 19 hard coal mines, resulting in an estimated decline in employment from 76,000 miners in 1997 to 36,000 by 2005. As of December 2000, 12 hard coal mines in Germany were still in operation.



In October 2000, the EC Energy Commissioner Loyola de Palacio demanded that Germany rework this subsidization scheme or risk legal action. The EC claimed that too much of

that amount will be spent on subsidizing continuing production, and not enough devoted to ending production. This dispute was resolved in November 2000, by allocating part of the annual coal subsidy volume to a different category of coal aid, namely, to "mines that will definitely be closed at some point." In July 2001, the EC set out new proposals to maintain a significant coal industry in the EU (for reasons of energy security) that will allow Germany to provide billions of euros in aid over the coming years. Specifically, under the proposals German aid would fall to 2.8 billion euros in

2005, which does not differ greatly from the domestic agreements of 1997. The most recent aid package of 2 billion euros from January 1, 2002 to July 23, 2002, was approved by the EC in October 2001.

Decreasing coal production has brought about changes in the industry's organization. Two major producers, Saarbergen and Ruhrkohle Bergbau, merged to form Deutsche Steinkohle (DSK), which accounts for 96% of German production. DSK is part of the larger RAG group, which intends to diversify its holdings and focus less on coal as the sector shrinks in coming years. RAG is itself owned by E. On, RWE, Thyssen, and two holding companies.

As domestic production declines, Germany is emerging as a significant coal importer. Imports of hard coal, coke, and briquettes increased by 8.5% in 1999-2000, and are estimated to have increased even more in the first few months of 2001. The largest supplier is Poland, followed by Australia, South Africa, and Colombia, among others. The Federation of German Coal Importers expects German hard coal imports to exceed domestic production in 2001 or 2002, and to double over the next 20 years, as nuclear power is phased out and domestic production declines.

Germany's lignite production is separate from hard coal production. Lignite was the most important fuel in the former East Germany, and East Germany had been producing about three times as much lignite as West Germany in the years prior to reunification. Since reunification, wasteful and environmentally damaging mining methods practiced during Communist rule have been reformed. The industry also has been privatized. Lignite production in Germany fell from 308 million short tons (Mmst) in 1991 to 178 Mmst in 1999. Rheinbraun, a subsidiary of RWE, is responsible for most of German lignite production, and most of its lignite is used to produce electricity in RWE's power generation plants.

RAG has founded a new company called Minegas to exploit the mine gas from operational and closed mines for electricity generation. Minegas has

already formed a consortium with several other German companies and a partnership with RWE. The target is to generate 450 gigawatts (GW) per year from mine gas.

## **ELECTRICITY**

Germany has Europe's largest electricity market. In 1999, Germany generated 531.4 billion kilowatt hours (bkwh) of electricity, two-thirds of which came from fossil fuels (mostly coal), with the other other third coming mostly from nuclear power along with small amounts of hydropower and other renewable sources. Although Germany produced more electricity than it consumed, the country was a small net electricity importer, because of transmission losses, proximity to foreign sources of generation, etc. Germany has about 2,800 power plants and considerable excess generation capacity. The International Energy Agency predicts slow power demand growth in coming years. Major electricity companies recently have announced intentions to decrease generation capacity and output, and new power plant construction is at record lows. There is a new gas-fired, combined-cycle power plant with a capacity of 400 megawatts (MW) that was inaugurated by Kraftwerke Mainz-Wiesbaden near Frankfurt in March 2001.

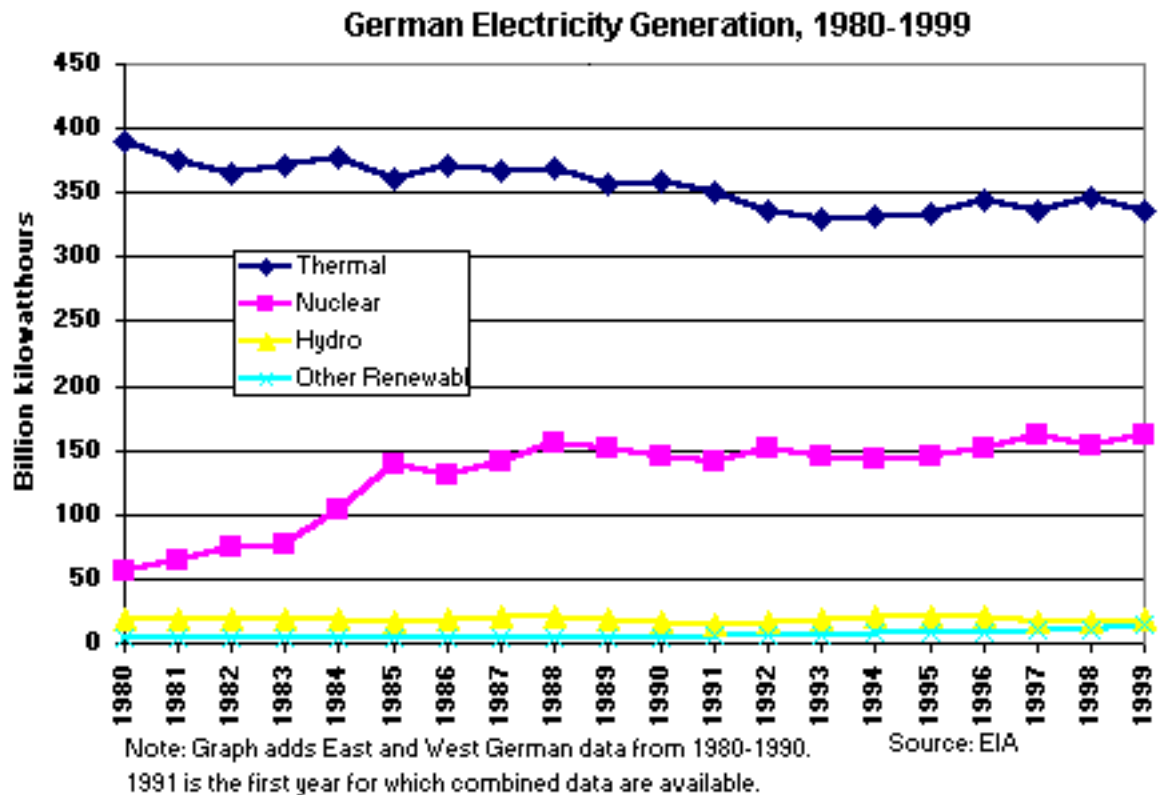
The industry is undergoing changes in fuel mix and in organization. Efforts continue to phase out nuclear power and to increase reliance on renewable energy sources, most notably wind power, and on natural gas. RWE is developing fuel cell technology for electricity generation that it hopes to have functioning by 2004.

## Sector Organization

In step with EU legislation, the German power market has become one of the most competitive in Europe. Liberalization of the electricity

sector has progressed via agreements among major participants in the market and is not overseen by any regulatory body (like the natural gas sector). Some German market groups and the European Commission have called for an energy regulator, but so far the government has only created a six-member division of the cartel office dedicated to handling complaints about the electricity sector. About one million of Germany's 40 million electricity customers have switched to competitive suppliers. About 1,000 terrawatthours were traded in 2000. Liberalization has resulted in lower consumer prices and decreased employment in the industry, and is now sparking a wave of consolidation.

Six major electricity generation companies have dominated the German market in recent years, accounting for about 80% of generation. Major mergers are re-shaping the industry, potentially reducing the number of major players from six to three. RWE, the largest electricity company in Germany, has acquired VEW, the country's sixth-largest electricity producer. E. On, Germany's second largest electricity company, is set to acquire UK energy provider Powergen in a \$16.9 billion deal. Powergen owns U.S. utility LG&E Energy, so when the deal is complete E. On will be world's second-largest



energy provider after Electricite de France, and will have a significant presence in the U.S. E. On and Verbund of Austria agreed in July 2001, to combine their hydroelectric generation assets into one company, European Hydro Power, which would own about 200 plants with a total of 9,600 MW. In June 2001, the formation of Germany's third-largest energy company was announced by Hamburgische Electricitaets-Werke (HEW). A new holding company is being formed that is expected to be complete by 2003 that will control HEW, Berlin utility BEWAG, eastern German generation group VEAG, and lignite-mining company LAUBAG. Through a series of acquisitions, the company will be owned by HEW, Vattenfall of Sweden, and Mirant of the United States

The utility market is highly fragmented in Germany, with about 70 regional utilities and 900 municipal utilities, which together account for about 20% of power generation and about two-thirds of distribution. The Deutsche Verbundgesellschaft (DVG), which groups the main supra-regional utilities and deals with national and international interconnections issues, and the Vereinigung Deutscher Elektrizitaetswerke (VDEW), which deals with economic and other technical issues. The regional utilities are grouped in the Arbeitsgemeinschaft Regionaler Energie Versorgungsunternehmen (ARE), the Stadtwerke are grouped in the Verband Kommunalen Unternehmen (VKU), and industrial producers are in the Vereinigung Industrielle Kraftwirtschaft (VIK).

Despite the overall success of liberalization, third party access to transmission networks remains a contentious issue. The *Verbandervereinbarung* that determines access to the grid system was first agreed in May 1998 and left transmission control mostly in the hands of the six major companies. After much criticism, a new *Verbandervereinbarung* was agreed in December 1999. This agreement has encountered even more criticism than its predecessor, and EU competition authorities have expressed concern. The most criticized aspects of the agreement include a lack of price transparency and the division of the German market into two distinct trading zones.



The German government has been critical of EU member governments that have not taken steps to open their power sectors in accordance with EU law. Currently, German electricity companies do have the right to block electricity imports from countries that deny access to foreign companies. The Minister of Economics, Werner Mueller, has proposed that German energy law be amended to extend the right to invoke bans, known to the government as "reciprocity clauses." However, the European Association of Transmission System Operators (ETSO) is urging Germany to adopt its policy of socializing network access costs such that costs of flows of electricity between grids is passed on to all users to promote exchange. Germany wants to pass export costs on to just exporters. If Germany does not agree to ETSO's policy, there is the possibility of Germany being excluded from the system. A decision will have to be taken by ETSO by the end of the year.

## **Nuclear Power**

Currently, Germany ranks fourth worldwide in installed nuclear capacity, behind the United States, France, and Japan. Germany's 19 nuclear plants comprise about 21% of Germany's electric generation capacity, and about 30% of actual generation. E. On, RWE, HEW, and EnBW own nuclear generation capacity, with E. On holding stakes in 11 of Germany's 19 nuclear power reactors.

Nuclear power has become controversial since the September 1998 elections. The Greens, the environmental party that is part of the ruling alliance, are staunchly opposed to the continued use of nuclear power. Chancellor Schroeder had decided to close all 19 nuclear reactors in 2005, but he has since amended his position. The government formally signed an agreement with utility companies in June 2001 to gradually phase out nuclear power. Each nuclear plant is allowed to produce a finite amount of electricity, and plants will have a life span of 32 years. The deal could see the total elimination of nuclear power by 2021, as the newest nuclear plant opened in 1989. Generation volumes are transferable; if an older plant closes before reaching its production ceiling, its remaining allowable production can be transferred to a new plant.

There are few economically viable alternatives to quickly replace such a significant portion of the fuel mix, especially in the wake of power-sector liberalization. As European markets become more liberalized and more price-sensitive, replacing the mostly amortized plants will prove difficult. Over the longer term, however, high costs (high fixed costs, long depreciation periods and long annual operating times) associated with nuclear generation could work to decrease nuclear generation's role in Germany's power sector. Nuclear installations currently are initiating programs to reduce production costs and waste disposal costs in order to become more price-competitive. In October 2000, E. On and RWE announced intentions to close a number of their less competitive (in terms of price) nuclear power plants. Some executives in Germany's nuclear industry have claimed that the June 2001 agreement is not irreversible, and that an electricity shortage and a change in the political climate might lead to a renewal of nuclear energy.

## **ENVIRONMENT**

Germany has a strong commitment to protecting its environment. It has actively promoted the use of renewable energy, both under the Kohl government with the Electricity Feed Law, and now under Schroeder's government with eco-taxes. In Germany's eco-tax regime, energy tax (energy taxes are slated to increase 10% over the next three years) revenue is used to fund renewable projects. However, in late October 2001, the Chancellor's chief economic advisor indicated that these ecological taxes may be suspended for a year or two as a way to provide a stimulus to economy.

In 1999, Germany emitted 236.9 million metric tons of carbon from the consumption of fossil fuels. Germany ranks third in total carbon emissions within the G-7, after the United States and Japan. Germany signed the Framework Convention on Climate Change in Rio de Janeiro in June 1992 and ratified it on December 9, 1993. Signers of the agreement pledged to stabilize per capita CO<sub>2</sub> emissions in the year 2000 and beyond at 1990 levels. Under the Kyoto Protocol of December, 1997, Germany would have to

go even further by reducing carbon emissions 8% by 2008-2012. This will be made more achievable given the sharp drop in total German carbon emissions since 1990, due mainly to decreased consumption of energy overall (and in particular lignite) in the former East Germany.

*Sources for this report include: CIA World Factbook; Dow Jones; Economist Intelligence Unit ViewsWire; Petroleum Intelligence Weekly; Financial Times; Economist; Petroleum Economist; U.S. Energy Information Administration; WEFA World Economic Outlook.*

## **COUNTRY OVERVIEW**

**President:** Johannes Rau (elected May 1999)

**Chancellor:** Gerhard Schroeder (elected September 1998)

**Independence:** January 18, 1871 (reunification of West and East Germany took place on October 3, 1990)

**Population (2001E):** 83 million

**Location/Size:** Central Europe, bordering the Baltic Sea and the North Sea, between the Netherlands and Poland, south of Denmark/137,821 square miles (slightly smaller than Montana)

**Major Cities:** Berlin (national capital since 10/3/90), Hamburg, Munich, Cologne, Frankfurt, Essen, Dortmund, Stuttgart

**Language:** German

**Ethnic Groups:** German 91.5%, Turkish 2.4%, other 6.1% (made up largely of Serbo-Croatian, Italian, Russian, Greek, Polish, Spanish)

**Religions:** Protestant 38%, Roman Catholic 34%, Muslim 1.7%, unaffiliated or other 26.3%

**Defense (8/98):** Army, 230,600; Navy, 26,700; Air Force, 76,200 (including conscripts)

## **ECONOMIC OVERVIEW**

**Finance Minister:** Hans Eichel

**Currency:** Deutsche Mark (DM)

**Exchange Rate (12/02/01):** 1 US Dollar = 2.1981 DM

**Gross Domestic Product (GDP, nominal, 2000E):** \$1.87 trillion (2001E):

**\$1.89 trillion**

**Real GDP Growth Rate (2000E): 3.0% (2001E): 1.1%**

**Inflation Rate (consumer prices, 2000E): 1.9% (2001E): 2.7%**

**Unemployment Rate (2000E): 9.6% (2001E): 9.5%**

**Exports of Goods (2000E): \$549 billion**

**Imports of Goods (2000E): \$492 billion**

**Major Trading Partners (2000):** France, U.S., U.K., Italy, Netherlands

**Major Export Products (2000):** Machinery and transport equipment, manufactured goods, chemicals

**Major Import Products (2000):** Machinery and transport equipment, manufactured goods, other finished goods, fuels

## **ENERGY OVERVIEW**

**Minister of Economics:** Werner Mueller

**Proven Oil Reserves (1/1/01E):** 380 million barrels

**Oil Production (2000E):** 139,000 barrels per day (bbl/d), of which 64,000 bbl/d was crude oil

**Oil Consumption (2000E):** 2.76 million bbl/d

**Net Oil Imports (1999E):** 2.7 million bbl/d

**Natural Gas Reserves (1/1/01E):** 11.5 trillion cubic feet (Tcf)

**Natural Gas Production (1999E):** 0.82 Tcf

**Natural Gas Consumption (1999E):** 3.0 Tcf

**Coal Reserves (12/31/96E):** 73.9 billion short tons

**Coal Production (1999E):** 226 million short tons (Mmst)

**Coal Consumption (1999E):** 258 Mmst

**Net Coal Imports (1999E):** 32 Mmst

**Electric Generation Capacity (1/1/99E):** 108 gigawatts

**Electricity Production (1999E):** 531.4 billion kilowatthours

## **ENVIRONMENTAL OVERVIEW**

**Minister for Environment:** Juergen Trittin

**Total Energy Consumption (1999E):** 13.9 quadrillion Btu\* (3.6% of world total energy consumption)

**Energy-Related Carbon Emissions (1999E):** 229.9 million metric tons of

carbon (3.7% of world total carbon emissions)

**Per Capita Energy Consumption (1999E):** 170.4 million Btu (vs U.S. value of 355.8 million Btu)

**Per Capita Carbon Emissions (1999E):** 2.8 metric tons of carbon (vs U.S. value of 5.5 metric tons of carbon)

**Energy Intensity (1999E):** 7,280 Btu/ \$1990 (vs U.S. value of 12,638 Btu/ \$1990)\*\*

**Carbon Intensity (1999E):** 0.12 metric tons of carbon/thousand \$1990 (vs U.S. value of 0.19 metric tons/thousand \$1990)\*\*

**Sectoral Share of Energy Consumption (1998E):** Industrial (41.9%), Residential (24.2%), Transportation (21.5%), Commercial (12.3%)

**Sectoral Share of Carbon Emissions (1998E):** Industrial (37.4%), Transportation (25.6%), Residential (24.5%), Commercial (12.5%)

**Fuel Share of Energy Consumption (1999E):** Oil (41.4%), Coal (23.2%), Natural Gas (21.2%)

**Fuel Share of Carbon Emissions (1999E):** Oil (45.1%), Coal (36.3%), Natural Gas (18.6%)

**Renewable Energy Consumption (1998E):** 395 trillion Btu\* (5% increase from 1997)

**Number of People per Motor Vehicle (1998):** 1.9 (vs U.S. value of 1.3)

**Status in Climate Change Negotiations:** Annex I country under the United Nations Framework Convention on Climate Change (ratified December 9th, 1993). Under the negotiated Kyoto Protocol (signed on April 29th, 1998, but not yet ratified), Germany, as a member of the European Union, has agreed to reduce greenhouse gases 8% below 1990 levels by the 2008-2012 commitment period.

**Major Environmental Issues:** Emissions from coal-burning utilities and industries and lead emissions from vehicle exhausts (the result of continued use of leaded fuels) contribute to air pollution; acid rain, resulting from sulfur dioxide emissions, is damaging forests; heavy pollution in the Baltic Sea from raw sewage and industrial effluents from rivers in eastern Germany; hazardous waste disposal.

**Major International Environmental Agreements:** A party to Conventions



on Air Pollution, Air Pollution-Nitrogen Oxides, Air Pollution-Sulphur 85, Air Pollution-Sulphur 94, Air Pollution-Volatile Organic Compounds, Antarctic-Environmental Protocol, Antarctic Treaty, Biodiversity, Climate Change, Desertification, Endangered Species, Environmental Modification, Hazardous Wastes, Law of the Sea, Marine Dumping, Nuclear Test Ban, Ozone Layer Protection, Ship Pollution, Tropical Timber 83, Tropical Timber 94, Wetlands, Whaling . Has signed, but not ratified, Air Pollution-Persistent Organic Pollutants.

\* The total energy consumption statistic includes petroleum, dry natural gas, coal, net hydro, nuclear, geothermal, solar, wind, wood and waste electric power. The renewable energy consumption statistic is based on International Energy Agency (IEA) data and includes hydropower, solar, wind, tide, geothermal, solid biomass and animal products, biomass gas and liquids, industrial and municipal wastes. Sectoral shares of energy consumption and carbon emissions are also based on IEA data.

\*\*GDP based on EIA International Energy Annual 1999.

## ENERGY INDUSTRIES

**Major Energy Companies:** *Oil:* Deutsche Shell, Esso, Ruhr Oel; *Natural Gas:* Ruhrgas, Wintershall/Wingas; *Coal:* DSK, RAG; *Electricity:* RWE, Viag, Veba

**Major Refineries (crude capacity, bbl/d):** Karlsruhe (285,800), Bayernoil (258,000), Schwedt (230,000), Gelsenkirchen (227,000), Leuna (214,000), Wilhelmshaven (225,000), Godorf (170,000), Wesseling (140,000), Esso Ingolstadt (105,000)

## LINKS

For more information from EIA on Germany, please see:

[EIA - Country Information on Germany](http://www.eia.doe.gov/emeu/cabs/germany.html)

Links to other U.S. Government sites:

[CIA World Factbook - Germany](#)

[U.S. Department of Energy's Office of Fossil Energy's International section - Germany](#)

[U.S. Department of Energy on German Nuclear Sector](#)

[U.S. State Department's Consular Information Sheet - Germany](#)

[U.S. State Department's Country Commercial Guide - Germany](#)

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# Regional Indicators: European Union (EU)

*The European Union, with increasingly integrated economies and energy sectors, is the world's second-largest energy consumer (behind the United States). EU members include: [Austria](#), [Belgium](#), [Denmark](#), [Finland](#), [France](#), [Germany](#), [Greece](#), [Ireland](#), [Italy](#), [Luxembourg](#), [the Netherlands](#), [Portugal](#), [Spain](#), [Sweden](#), and the [United Kingdom](#).*

*Note: Information contained in this report is the best available as of October 2002 and is subject to change.*



## BACKGROUND

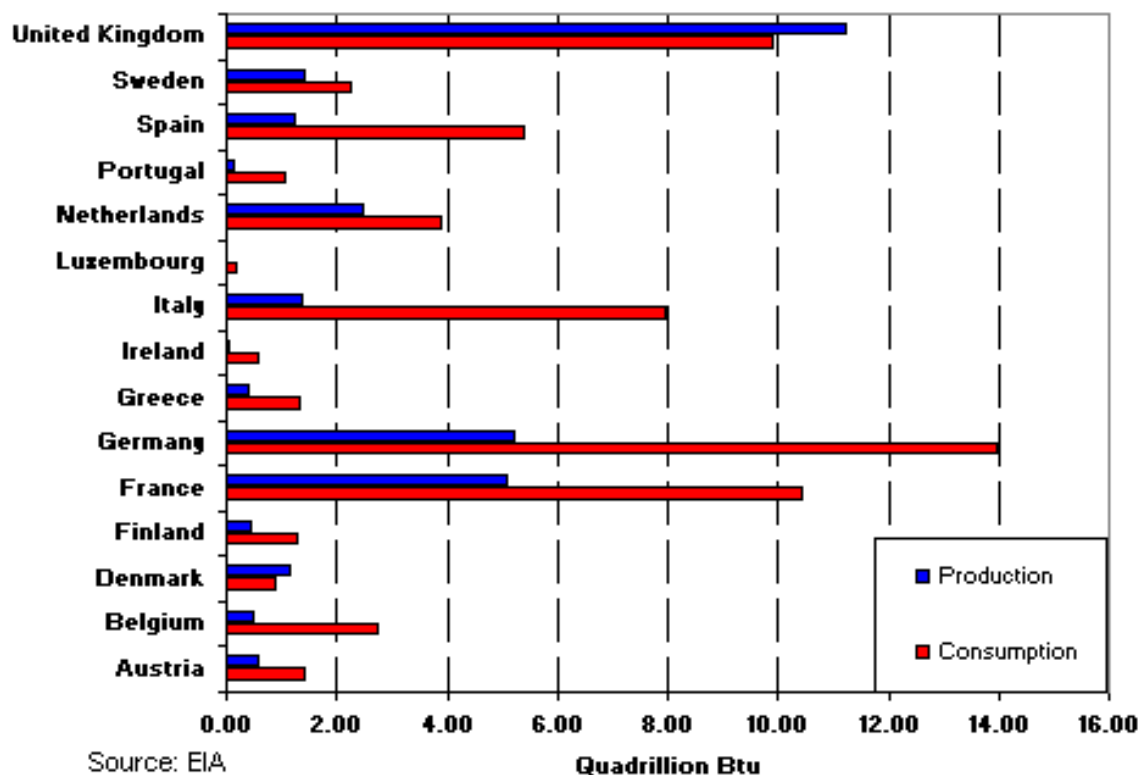
The European Union (EU) was founded as the European Economic Community (EEC) by the Treaty of Rome in 1957 to promote economic and political integration in Europe. The founding of the EEC followed the creation of the European Coal and Steel Community, established after World War II as a means of promoting integration among former enemies. The EEC has expanded from its original six members (Belgium, France, the Federal Republic of Germany, Italy, Luxembourg, and the Netherlands) to include the United Kingdom, Ireland, and Denmark in 1973; Greece in 1981; Spain and Portugal in 1986; and Austria, Finland, and Sweden (former members of the European Free Trade Association) in 1995.

All 15 member states delegate a degree of sovereignty to the EU's network of institutions. National governments are represented in the Council of the European Union, while citizens of the member states are elected to the European Parliament. In 1993, the Maastricht Treaty (which renamed the EEC as the European Union), created European citizenship, strengthened the power of the European Parliament, laid out plans for the Economic and Monetary Union (EMU), as well as committed members to negotiate for expansion of the EU to include Central and Eastern European countries. As part of EMU, 12 EU member countries (Belgium, France, Germany, Greece, Italy, Spain, Portugal, Finland, Austria, the Netherlands, Ireland and Luxembourg) adopted a new common European currency, called the "euro". The Euro currency entered into general circulation in January 2002. Monetary policy is overseen by the European Central Bank, which works in conjunction with the national central banks of the 12 euro zone countries.

In 2001, the Treaty of Nice was signed by member governments. This treaty changed the way the institutions of the EU operate in order to make possible the admission of new member states in the future. At its next scheduled meeting in December 2002, the EU Council of Ministers is expected to nominate Poland, the Czech Republic, Slovakia, Hungary, Estonia, Latvia, Lithuania, Slovenia, Malta, and Cyprus for entry in to the EU in 2004. Many other countries also aspire to EU membership, including Romania and Bulgaria, which are expected to join in 2007.

The combined economies of the EU are slightly smaller than the U.S. economy (\$9.2 trillion purchasing power parity gross domestic product for the EU in 2001 versus \$9.9 trillion for the United States), while the EU population of 376.8 million significantly exceeds the U.S. population of 278 million. The United States has extensive trade relations with the EU. In 2001, 22% of U.S. exports (\$159 billion) went to EU members, and 19% of U.S. imports (\$220 billion) originated in EU countries.

**EU Energy Production and Consumption, 2000**



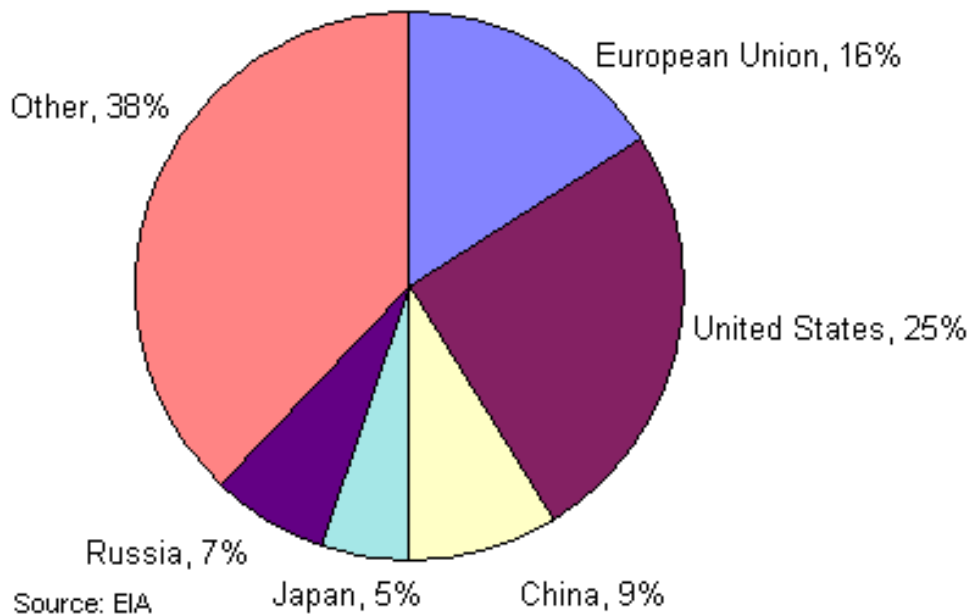
## ENERGY

On the whole, the members of the European Union are net energy importers. Import dependency is forecast to grow in the future, as the European Commission estimates that the EU could be forced to import 70% of its total energy, and up to 90% of its oil in the next 20 to 30 years if no new measures are taken.

Germany, Italy, and France are the EU's largest net importers of energy; the United Kingdom is the only significant net exporter (see graph). EU oil is imported primarily from the Persian Gulf region, Norway, Russia, and North Africa. Russia also exports significant amounts of natural gas to the EU countries.

EU members possess only about 0.7% of the world's proven reserves of oil and 2.5% of the world's natural gas reserves (see [Table 3](#)). However, they have 7.3% of proven coal reserves, 16% of the world's capacity for refining crude oil into petroleum products, and 17% of the world's electric generating capacity. In 2000, they produced 4.5% of the world's crude oil, 9% of the world's natural gas, and 7% of the world's coal.

### 2000 World Energy Consumption



### Energy Consumption

In 2000, the 15 EU countries consumed 63.3 quadrillion British thermal units (Btu) of energy, which represents 16% of the world's total energy consumption and is 35.5 quadrillion Btu's less than the United States energy consumption for the year. EU members consumed about 33% of the world's nuclear power, 19% of the world's oil, 16% of the world's natural gas, and 9% of the world's coal in 2000.

Oil is the dominant fuel, (see [Table 2](#)), accounting for 43% of total EU energy consumption in 2000, followed

by natural gas at 23%. Over the past decade, natural gas has been the fastest growing fuel source in the EU, mainly at the expense of coal, whose share has declined sharply. This is in part due to environmental considerations, but also due to increased availability of natural gas supplies because of pipelines from Algeria, Norway, and Russia. By 2010, natural gas is expected to account for 26% of EU energy consumption.

Nuclear power generation has grown only slightly over the past decade. Eight EU member states are currently operating nuclear power plants, and five of these (Sweden, Spain, the Netherlands, Germany, and Belgium) have announced moratoriums. In May 2002, however, the Finnish Parliament approved plans to build a new nuclear reactor, marking the first expansion of nuclear power in the EU in over ten years. Hydroelectric power consumption has grown by almost 20% over the past decade and accounted for approximately 5% of total EU power consumption in 2000. Other "renewables" (geothermal, biomass, solar, and wind) quadrupled between 1991 and 2000, but still constituted only 1% of total EU energy consumption in 2000. Renewable energy and natural gas are expected to be the two fastest growing fuels in the EU over the next 20 years.

### Energy Policy and the Internal Market

Although energy policy was not stipulated in the original treaties establishing the modern European Union, the political and economic policies governed by the EU have found a natural confluence in energy policy. Moreover, many of the EU countries share a similar energy profile, and could face significant import dependency problems in the coming years.

In November of 2000, a [European Commission Green Paper on Energy Security](#) outlined the EU's unified energy strategy. The paper identifies four main principles of European energy policy: 1) security of supply, 2) completion of the internal market, 3) environmental responsibility and 4) promoting renewable energy and demand management. To these ends, the European Union has acted over the years to coordinate the member countries' energy policies and the infrastructure that links them.

Community energy policy is developed and implemented by the Energy and Transport Directorate-General, which has its headquarters in Brussels. The Energy and Transport Directorate-General reports to the European Commission, which in turn drafts legislative proposals for the European Parliament. The Parliament then works

with the Council of the European Union, (which is made up of government officials from the member states) to amend, and eventually adopt energy legislation for the entire EU.

Integrating the energy sectors of EU members is a work-in-progress. Incremental steps toward enjoining member countries' energy sectors have been taking place since the early 1990s. Because existing treaties already govern the coal and nuclear sectors, and the oil industry was considered to be sufficiently open, most of the EU's recent energy legislation has focused on electricity and natural gas.

In 1996, after years of deliberations, the EU Directive on Electricity was passed, stipulating the deregulation of the production and transport of electricity in EU member states, and setting a schedule for the opening of member countries' markets to free competition. The Electricity Directive originally called for incremental market liberalization, with 32% of the market to be open to free competition by 2003 (Greece, Belgium and Ireland were granted waivers). In 1998, the E.U. Natural Gas Directive was passed with similar provisions, calling upon the member countries to adapt national law to facilitate market opening, and setting a similar schedule of annual market-liberalization benchmarks (with Greece, Belgium, and Ireland again granted waivers).

Energy market liberalization has gained unprecedented support recently as the European Council in March 2000 called upon the European Commission to expedite the opening of energy markets. In March 2001, the Commission advanced the timetables to achieve full market liberalization by 2005. In March 2002, EU leaders at the Barcelona Summit confirmed their commitment to opening up natural gas and electricity markets, declaring that access to business and commercial customers will be completely open by 2004. The European Parliament has passed a draft resolution on opening electricity and natural gas markets, which will go before EU member energy ministers in November. Approving market opening for residential customers has proven much more contentious, with no deadline set as of yet.

The Energy and Transport Directorate-General also oversees efforts to increase the role of renewable energy sources in the EU fuel mix, as well as demand management programs. The promotion of renewable energy and energy efficiency are handled by the EU's [Altener](#), and [SAVE](#) programs respectively. The two programs have been in place since the early 1990s, and in April of 2002 were renewed under the European Commission's proposal, "Intelligent Energy for Europe (2003-2006)." Currently, renewable energy accounts for 5.6% of EU energy consumption. The EU aims to derive 12% of the group's energy consumption from renewable fuels by 2010.

In September 2002, the European Commission proposed that EU member states make arrangements to hold an additional 40 days worth of strategic oil stocks in a joint European reserve pool. These proposed reserves would supplement each state's individual reserves, which are supposed to amount to 90 days worth of consumption. Currently, the EU member states are estimated to hold on average 115 days worth of oil, depending on the country. The Commission aims to raise strategic oil stocks across the EU to 120 days worth of consumption by 2007.

## ENERGY USE AND CARBON EMISSIONS

In 2000, EU members generated 896 million metric tons of energy-related carbon emissions, representing 14% of the world total for that year. Of the EU countries, Germany emitted the most carbon (220 Mmt), followed by the United Kingdom (148 Mmt), Italy (117 Mmt) and France (109 Mmt), with each of the countries showing a decline in carbon emissions since last year. Under the December 1997 Kyoto Protocol, the EU is obligated to reduce its greenhouse gas emissions 8% from 1990 levels (in that year, the EU emitted 913 Mmt of carbon) by 2008-2012. All EU member states signed the Kyoto Protocol on April 29, 1998. On June 17, 1998, the EU agreed on how it would meet the 8% reduction. Under this agreement, different EU member states are assigned varying degrees of

emission cuts, ranging from a 4% increase in the case of Sweden, to a reduction of 28% in the case of Luxembourg, with other countries somewhere in between.

**Table 1. Economic and Demographic Indicators for EU Countries**

	Gross Domestic Product (GDP) (purchasing power parity)				Population, 2001E (Millions)
	2001E (Billions of U.S. Dollars)	Real GDP Growth Rate		Per Capita, 2001E(U.S. Dollars)	
		2001 Estimate	2002 Projection		
Austria	\$223.6	1.0%	1.0%	\$27,300	8.2
Belgium	\$286.7	1.0%	1.0%	\$27,800	10.3
Denmark	\$151.2	1.0%	1.4%	\$28,500	5.3
Finland	\$132.8	0.7%	1.2%	\$25,500	5.2
France	\$1,483	1.8%	1.1%	\$25,000	59.0
Germany	\$2,113.6	0.7%	0.4%	\$25,700	82.4
Greece	\$184.9	4.1%	3.8%	\$17,400	10.6
Ireland	\$123.2	5.9%	3.4%	\$32,400	3.8
Italy	\$1,414	1.8%	0.4%	\$24,500	57.8
Luxembourg	\$23.5	3.5%	2.7%	\$58,700	0.4
Netherlands	\$420.7	1.1%	0.7%	\$26,300	16
Portugal	\$178.8	1.7%	0.8%	\$17,900	10.0
Spain	\$804.8	2.7%	2.0%	\$20,400	39.5
Sweden	\$222.1	1.1%	1.6%	\$25,000	8.8



<b>United Kingdom</b>	\$1,462.9	1.9%	1.6%	\$24,600	59.5
<b>Total</b>	<b>\$9,225.8</b>	<b>1.6%</b>	<b>1.0%</b>	<b>\$27,100</b>	<b>376.8</b>

Sources: DRI-WEFA World Economic Outlook, World Bank.

**Table 2. Energy Consumption and Carbon Emissions in EU Countries, 2000**

	Energy Consumption								Carbon Emissions (Million metric tons)
	Total (Quadrillion Btu)	Petroleum	Natural Gas	Coal	Nuclear	Hydroelectric	Other Renewable Electricity	Net Electricity Imports	
<b>Austria</b>	1.41	39%	20%	10%	0%	31%	1%	-1%	18
<b>Belgium</b>	2.75	45%	23%	12%	17%	0.2%	0.4%	1.6%	40
<b>Denmark</b>	0.88	51%	23%	19%	0%	0.03%	7%	1%	16
<b>Finland</b>	1.30	32%	12%	11%	17%	12%	7%	9%	13
<b>France</b>	10.41	40%	15%	6%	39%	7%	0.4%	-7%	109
<b>Germany</b>	13.98	41%	22%	23%	12%	1%	1%	0.1%	220
<b>Greece</b>	1.33	63%	6%	28%	0%	3%	0.7%	0.0%	27
<b>Ireland</b>	0.59	60%	26%	13%	0%	1%	0.5%	0.2%	11
<b>Italy</b>	7.96	49%	32%	6%	0%	6%	2%	6%	117
<b>Luxembourg</b>	0.19	50%	15%	3%	0%	1%	0.4%	31%	2
<b>Netherlands</b>	3.91	45%	39%	8%	1%	0.04%	1%	5%	64
<b>Portugal</b>	1.08	64%	8%	14%	0%	11%	2%	1%	17
<b>Spain</b>	5.40	57%	12%	14%	11%	5%	1%	1%	81

<b>Sweden</b>	2.25	30%	1%	4%	24%	36%	2%	2%	13
<b>United Kingdom</b>	9.88	35%	36%	15%	10%	1%	1%	1%	148
<b>Total</b>	<b>63.32</b>	<b>43%</b>	<b>23%</b>	<b>13%</b>	<b>14%</b>	<b>5%</b>	<b>1%</b>	<b>0.7%</b>	<b>896</b>

Source: Energy Information Administration *Note: Percentages may not add to 100% due to independent rounding.*

**Table 3. Energy Supply Indicators--EU Countries**

	Fossil Fuel Proved Reserves			Fossil Fuel Production, 2000			Electric Generating Capacity, 1/1/00 (Million kilowatts)	Crude Oil Refining Capacity, 1/1/02 (Thousand barrels/day)
	Crude Oil, 1/1/02 (Million barrels)	Natural Gas, 1/1/02 (Trillion cubic feet)	Coal (Million short tons)	Oil (Crude, liquids, and processing gain; Thousand barrels/day)	Natural Gas (Trillion cubic feet)	Coal (Million short tons)		
<b>Austria</b>	86	0.9	28	22	0.1	1.4	14	209
<b>Belgium</b>	0	0.0	0.0	12	0.0	0.4	14	791
<b>Denmark</b>	1,113	2.7	0.0	367	0.3	0.0	13	176
<b>Finland</b>	0	0.0	0.0	0	0.0	0.0	16	239
<b>France</b>	140	0.4	40	79	0.1	5.2	110	1,896
<b>Germany</b>	364	12	72,753	144	0.8	225.3	109	2,259
<b>Greece</b>	9	0.2	3,168	9	0.0	69.5	10	407
<b>Ireland</b>	0	0.7	15	1	0.0	0.0	4	71
<b>Italy</b>	622	8.1	37	155	0.6	0.0	67	2,283
<b>Luxembourg</b>	0	0.0	0.0	0	0.0	0.0	0	0
<b>Netherlands</b>	107	62.5	548	89	2.6	0.0	21	1,206

<b>Portugal</b>	0	0.0	40	2	0.0	0.0	11	304
<b>Spain</b>	21	18	728	19	0.0	25.8	46	1,294
<b>Sweden</b>	0	0.0	1	0	0.0	0.0	34	424
<b>U.K.</b>	4,930	26	1,653	2,553	3.8	35.3	72	1,784
<b>Total</b>	<b>7,392</b>	<b>131.5</b>	<b>79,011</b>	<b>3,452</b>	<b>8.2</b>	<b>362.9</b>	<b>541</b>	<b>13,343</b>

Sources: Energy Information Administration, *Oil & Gas Journal*.

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# Germany: Environmental Issues

## Introduction

The current German government, elected in September 1998, is headed by the Social Democrat Chancellor Gerhard Schroeder, whose party rules in coalition with the environmentalist party, the Greens. The government's energy and environmental policy objectives include reducing energy-related emissions, phasing out nuclear power, and increasing Germany's reliance on renewable energy. The government has initiated a regime of "eco-taxes" to encourage more environmentally friendly energy use.

The Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety is headed by Green party member Juergen Trittin. This office also coordinates Germany's climate protection policy. While the country's commitment to the environment and reduction in emission of greenhouse gases (GHGs) is well known, Germany remains one of the world's largest carbon emitters.

Following the reunification of the country in 1990, the major task of German energy and environmental policy was to merge successfully the radically different systems of East and West Germany. West Germany had a diversified and mainly privately owned system of energy supply with a high standard of energy efficiency and a deep commitment to environmental protection. In contrast, East Germany's energy sector was highly centralized, predominantly state-owned, and mainly dependent upon relatively "dirty" lignite (brown coal) as its primary fuel. Cleaning up the former East Germany's environment, closing lignite mines in particular, was one of the primary objectives of the unified Germany's new energy and environment policy.

## Air Pollution

In the late 1970's and early 1980's it was widely believed that atmospheric pollution was killing the German Black Forest, a belief which contributed to the Green revolution that followed. The use of lignite coal from the former East Germany, the proximity to the highly polluting former Soviet bloc countries, and a very large transportation sector were the main sources of air pollution in Germany. In a 1996 assessment, forests were damaged to the point where only 43% could be considered healthy.

Today, there have been marked improvements in all polluting sectors, with transportation continuing to represent the largest source of German air pollution. Consequently, environmental policy has been tied directly to transportation policy.

According to the environment ministry, air pollution in Germany has decreased over the last ten years because of the widespread fitting of closed-loop three way catalytic converters, the phasing out of leaded



gasoline, better quality fuels and more efficient engineering. Though German cars are known for being the most fuel efficient, the huge growth in the number of cars has cancelled out most of the gains from this sector. There are presently more than 44 million cars and 4.5 million trucks on German roads.

## **Energy Use and Carbon Emissions**

Reduction of carbon emissions has been a major German international and domestic policy objective. In July, the German government hosted the sixth conference of parties (COP 6) of the Framework Convention on Climate Change in Bonn.

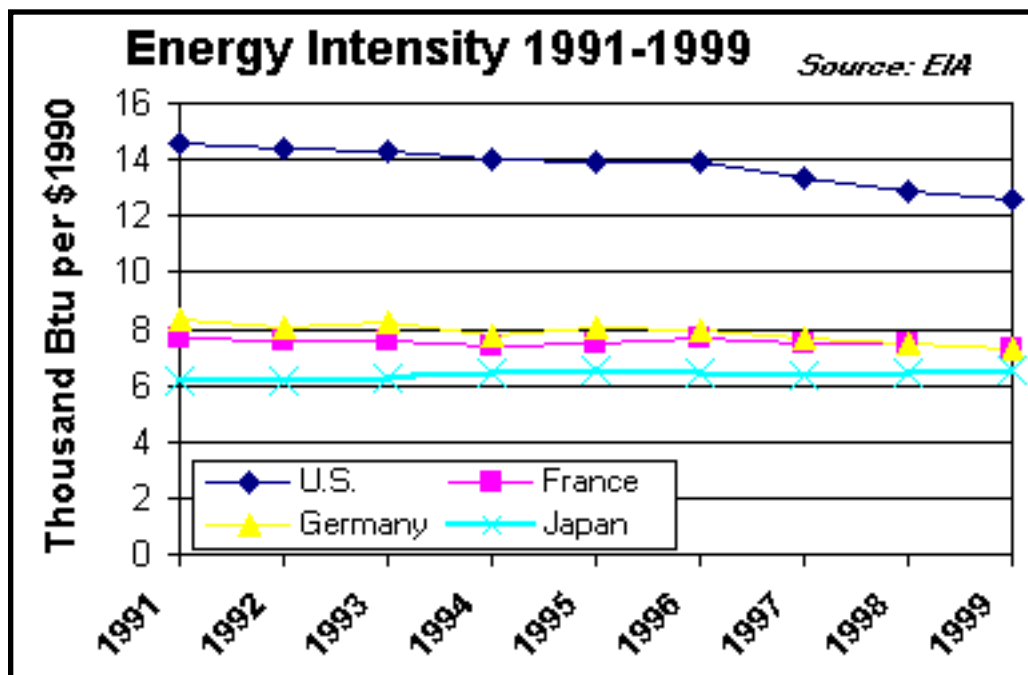
The German government has committed to reducing the country's carbon emissions by 21% below 1990 levels. They are currently 17% below these levels, largely due to dramatic reductions in the former East Germany following German reunification. While overall carbon emissions were down, the environment ministry stated that vehicle emissions had increased by 15% over the same period.

In 2001, Chancellor Schroeder signed an agreement with several different industries in order to reduce greenhouse gas emissions. The transportation industry has set a voluntary target of cutting new car fuel consumption 25% by 2005. In addition, the electricity industry has pledged to cut carbon emissions voluntarily by at least 20 million metric tons (mmt) by 2010. Additionally, the chemical industry (the second largest industrial energy consumer --behind steel in Germany) reduced its carbon emissions by around 30% (21mmt during 1990-1999), despite a 17% increase in production.

The Government and utilities have agreed to reduce carbon emissions by promoting co-generation power plants that produce both heat and electricity by recapturing the heat from natural gas driven power plants and converting it into useable energy. Converting to this type of system is very expensive, and utility companies are being permitted to pass some of these costs on to consumers (expected costs are DM 8 billion -- \$3.5 billion over ten years).

In 1999, Germany's energy related carbon dioxide emissions were 230 mmt of carbon, ranking Germany the sixth largest carbon emitter in the world after the United States (1520 mmt), China (669 mmt), Russia (400 mmt), Japan (307 mmt), and India (243 mmt). German energy consumption in 1999 accounted for 3.7% of the world total (14.0 quadrillion Btus).

## **Energy and Carbon Intensity**

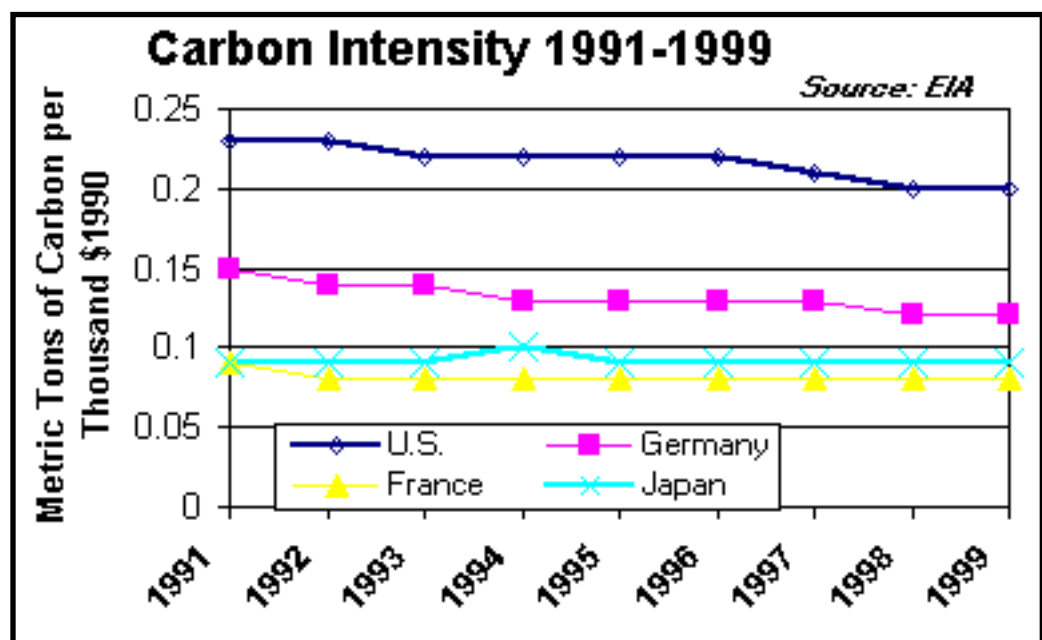


Energy consumed per unit of GDP (energy intensity) in Germany in 1999 was approximately 7.3 thousand Btu per \$1990. Energy intensity was about equal to other industrial Western European countries, above Italy (6.5 thousand Btu per \$1990) and Ireland (6.7), but below Spain (8.7), and about equal to France (7.3). The 1999 energy intensity reflects a 12.6% decrease in energy consumption from 1991 levels despite the country's economic growth over

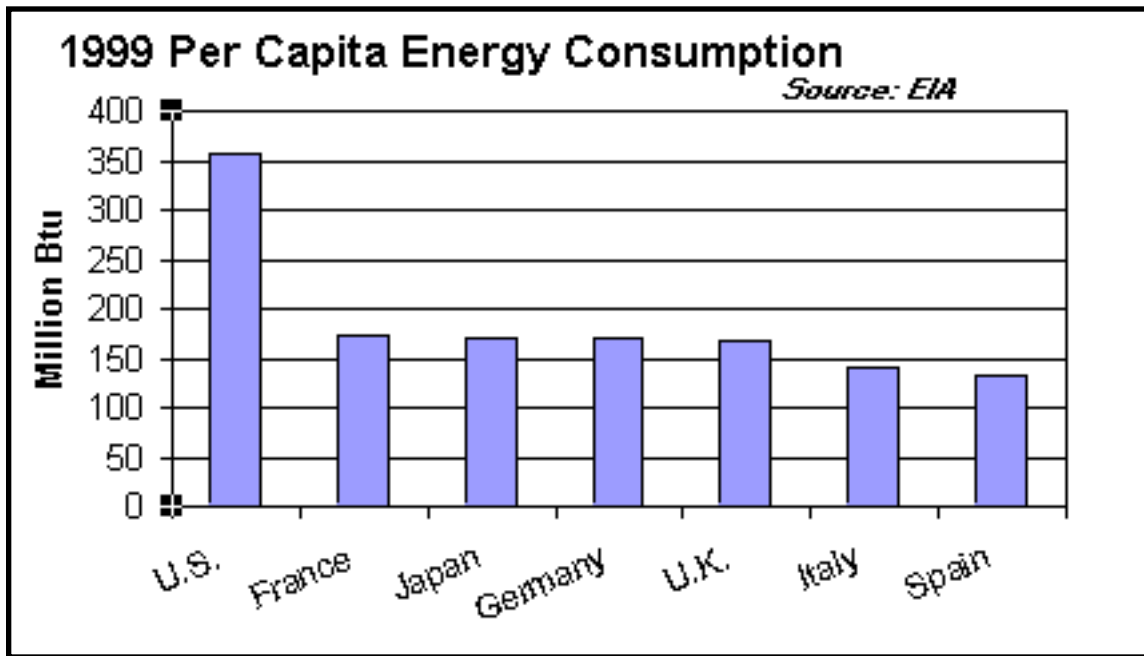
the same period.

Though German carbon intensity remains relatively high, it has declined almost 20% since 1991. Carbon emitted per unit of GDP in 1999 was 0.12 metric tons per \$1990. This level was about equal to industrial Western European countries, and considerably lower than the U.S. level of 0.20 metric tons per \$1990.

In 1999, Germany was the third largest coal consuming country in the world, behind the United States and China. The addition of "clean coal" technologies in former East German coal fired plants has helped to significantly reduce air pollution in Germany. However, coal is the most carbon intense fossil fuel. Some German industry experts believe that though there will be some reduction in the burning of hard coal, domestic lignite will continue to be used as the electricity sector adjusts to the country's planned nuclear phase out.



## Per Capita Energy Consumption and Carbon Emissions



German per capita energy consumption was similar to Western Europe and Japan in 1999, at 170.4 million Btu per person. 1999 per capita energy consumption was lower than the United States (355.9 Btu), Canada (410.7 Btu) and Belgium (256.1 Btu).

German per capita carbon emissions in 1999 were 2.8 tons of carbon per

person, higher than France (1.8 tons), Italy (2.1), and the U.K. (2.6), but lower than the United States (5.6) and Canada (4.9).

## **Nuclear**

The phasing out of nuclear power has been one of Chancellor Gerhard Schroeder's main environmental policy objectives while in office. In June 2001, the Chancellor and leading energy companies formally signed an agreement to shut down Germany's 19 nuclear power plants. This new pact limits the lifespan on nuclear plants, which provide close to one third of Germany's electricity, to an average 32 years of operation. Should this pact be enforced, it is likely that the newest plant operating in Germany would be closed by 2021. Germany is the first big industrial country to abandon nuclear energy.

The pact also requires the nuclear industry to construct interim waste-storage sites near the plants to reduce the unpopular transport of nuclear waste, and provides for the termination of spent nuclear fuel reprocessing by 2005. In the interim, plant operators will be required to drastically increase their liability coverage until they go offline.

## **Renewable Energy**

The German government is hoping to use renewable energy sources to compensate for the loss of atomic power through better conservation and new technology, particularly renewable resources. The environment minister has stated that up to 3/5 of nuclear power could be replaced by wind energy by 2030, though only a few of the additional plants have been built yet.

Germany's main renewable resource is wind power. In August 2001, Europe's largest wind farm, with a production capacity of 105 MW, opened in Paderborn in the northwestern part of Germany. The opening of this plant has increased Germany's total wind power capacity to 700 MW. In 1999 wind power already accounted for 2.8% of Germany's total electric power generation, a figure the government hopes to increase to 12.5% by 2010.

As suitable sites for additional wind farms in Germany are running out, the government is looking to build offshore wind power parks.

There are plans in the works to build about 40 wind generators offshore in a small-scale pilot project before 2004.



## **Outlook**

The German government has committed to reduce carbon dioxide emissions by 10 million tons by 2005 and 23 million by 2010. Germany's Environment Minister, Juergen Trittin has forecast that Germany will meet its target of cutting greenhouse gas emissions by 21% below 1990 levels by 2010.

According to the Energy Information Administration's *International Energy Outlook 2001*, Germany's total energy consumption is expected to grow at an annual rate of 0.9% annually through 2020. This figure is lower than projected annual GDP growth for Germany of 2.2% over the same period. Renewable energy sources are expected to increase at an average annual rate of 4.9%, nuclear energy consumption is expected to decrease at a rate of 4.5%, and carbon emissions are expected to decrease at a yearly rate of 1.0% for the reference case outlook.

[Return to Germany Country Analysis Brief](#)



## Country Analysis Briefs

[Home](#) > [Country Analysis Briefs](#) > [Norway Country Analysis Brief](#)[PDF version](#) | [PDB version](#)*September 2002*

[Background](#) | [Oil](#) | [Natural Gas](#) | [Coal](#) | [Electricity](#) | [Environment](#) | [Profile](#)  
| [Links](#)

## Norway

*Norway is a major non-OPEC source of oil and was the world's third largest net oil exporter in 2001. Norway is the second-largest natural gas exporter to western Europe.*

*Note: Information contained in this report is the best available as of September 2002 and is subject to change.*





## BACKGROUND

Norway's economy is characterized by substantial oil and natural gas revenues, growing government expenditures, a tight labor market, and closer linkage to international oil and gas prices than to the OECD business cycle. Norway is the third largest net oil exporter in the world, and the recent period of high oil prices have made for government budget and current

account surpluses and rising disposable income. The petroleum sector represents over 20% of Norway's gross domestic product (GDP). Norway continues to record large trade surpluses, mostly due to hydrocarbon exports. Real GDP growth for 2002 is forecast at 2.3%, a solid rate. Trade surpluses are expected to decline from about 14% to 8% into the later part of this decade. The consumer price growth forecast is at 1.5% in 2002, though the Norwegian Central Bank recently said that core inflation of 2.7% year-on-year in June had been "somewhat higher" than the bank had projected, so the bank raised interest rates slightly. The phasing-in of revenue from the state Petroleum Fund through additional spending and reduced taxation is expected to stimulate consumer spending. As this change is implemented, the central government's non-oil deficit is expected to rise from 2% of mainland GDP in 2001 to 5.5% by 2010, increasing mainland GDP by 0.4% annually.

Norway has a small industrial base apart from its oil and gas, shipping, and

fishing industries, and its mainland (i.e. excluding oil and natural gas) economy is forecast to grow by 1.2% in 2002. Manufacturing activity was up 1.4% year-on-year for the second quarter of 2002. Norway's government is concerned about its economic welfare once its oil runs out, as is predicted by the end of the first half of the 21st century. Norway makes annual contributions to its Petroleum Fund, a financial safety net for the time when oil revenues decline (and a means of reducing the inflationary impact of oil revenues). The government was able to pay Norwegian krone (Nkr) 53.5 billion (about \$7.1 billion) into the Petroleum Fund in the second quarter of 2002, for a total value of Nkr 605.4 billion.

A new center-right coalition took power in October 2001 after the Labor Party lost seats in the parliamentary election. The coalition consists of Prime Minister Kjell Magne Bondevik's Christian People's Party, the Conservative Party, and the Liberal Party. The government has sought to lessen government involvement in business and to lower taxes, though it remains quite involved in social and environmental policy. The government currently does not have plans to seek membership in the European Union.

Norway is part of the European Economic Area (EEA), but Norwegians have voted in two referenda against joining the European Union (EU). Recent polls have shown some increase in support for joining the EU. Norway has a history of state control over major industry, but this is beginning to change. Norway's reliance on oil revenues in the past resulted in a government preference for keeping Norwegian businesses under Norwegian control.

### **North Sea Oil and Natural Gas**

North Sea oil and natural gas were first discovered in the 1960s. The North Sea did not emerge immediately as a key non-OPEC oil producing area. North Sea production grew as major discoveries continued throughout the 1980s and into the 1990s. Although the region is a relatively high cost oil producer (breakeven is about \$12-\$14 per barrel, vs. \$3-\$4 per barrel in Iran, for example), its political stability and proximity to major European consumer markets have allowed it to play a major role in world oil and gas markets.

Many of the world's major crude oil prices are linked to the price of the North Sea's Brent crude oil - about \$150 billion in annual petroleum trade. Brent crude is a blend of North Sea crude oils and does not come exclusively from the Brent field. Because Brent crude is traded on the International Petroleum Exchange in London, fluctuations in the market are reflected in the price of Brent. Therefore, all other crude oils linked to Brent can be priced according to the latest market conditions. Brent production is forecast to fall precipitously from its current 400,000 barrels per day (bbl/d) by 2005, making the Brent price marker increasingly dated. Liquidity has fallen to about 10 cargoes per delivery month compared with 300-400 deals per month in the early 1990s. In response to this, pricing service Platts made a change effective July 10, 2002 allowing for substitution - at seller's option - of UK Forties and Norwegian Oseberg for Brent in an attempt to increase potential volumes and reduce volatility resulting from traders "cornering the market." The change has not been universally accepted, and it remains to be seen whether it will be successful. The International Petroleum Exchange (IPE), which runs the Brent futures market, appears to be waiting to see whether the over-the-counter market adopts Brent-Forties-Oseberg (BFO). The first full BFO contract was sold on August 8.

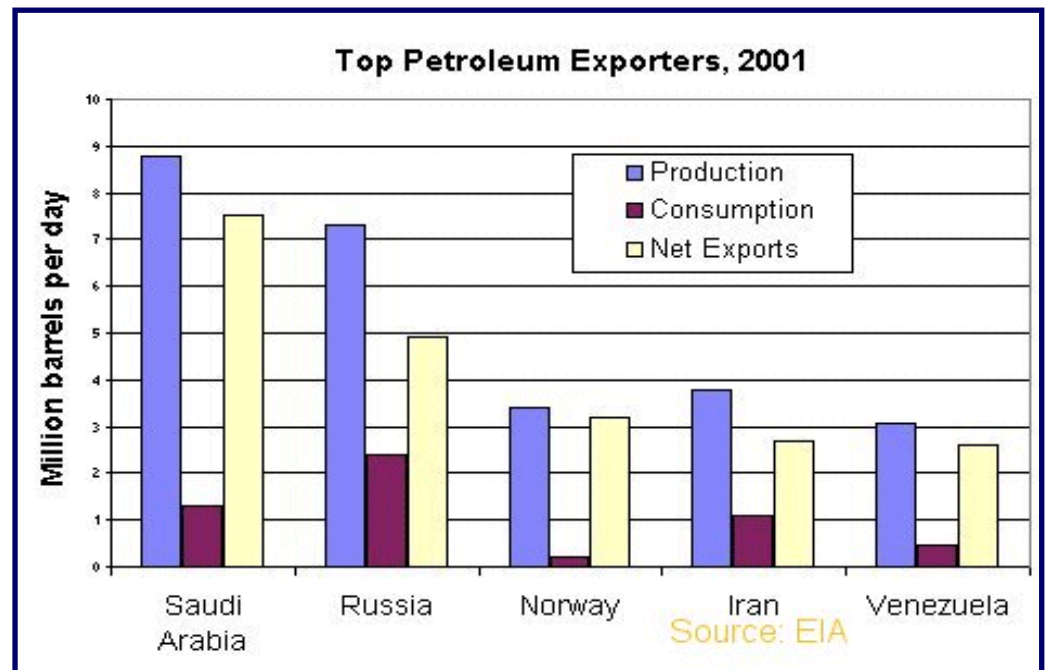
The late 1997-1998 oil price collapse had an adverse effect on North Sea production. In 1997 and 1998, North Sea oil production remained stable, whereas previous years had shown average annual increases of 400,000 bbl/d. The 1999-2000 oil price increase had the opposite effect: North Sea oil and gas production reached new heights in 2000, with oil production exceeding 6 bbl/d for the first time. However, the North Sea area is considered to be increasingly "mature," with few additional large discoveries likely to be made. Some predict that the North Sea will reach peak production of about 7 million bbl/d in the next two or three years, although technology developments could delay this. The average recovery rate for Norwegian fields is expected to eventually reach 44%. Because the North Sea is believed to be nearing its peak production, in both of the major North Sea producing nations, Norway and the United Kingdom (UK), government and industry are

taking steps to restructure their oil and natural gas sectors to make them more internationally competitive and also are increasing cooperation between the two countries. On August 28, 2002, Norway and the UK released a joint plan to increase cooperation, cut costs, and raise output, especially on aging fields. However, taxation rates will remain unharmonized. Norway also signed a cooperation agreement with Russia that same day that opens energy dialogue on the Arctic Barents Sea shared by the two countries.

## OIL

Norway has proven oil reserves of 9.44 billion barrels. In 2001, Norway was the world's third largest net oil exporter. Norway consumes very little of the oil it produces, and its oil exports are the country's greatest source of revenue. Norway's oil reserves are located exclusively offshore and mostly in the North Sea, with smaller deposits in the Norwegian Sea. The Barents Sea also is being explored. Oil production was about 3.4 million bbl/d in 2001, an increase of about 100,000 bbl/d over 2000. Production in the first half of 2002 was affected by a production cut agreement with OPEC.

In November 2001, Norway's Energy and Oil Minister announced that Norway would cooperate with OPEC and cut crude oil production for the first half of 2002 in an effort to shore up prices in the face of sagging demand.



Norway later agreed to cut production by 150,000 bbl/d, with target production at 3.02 million bbl/d. Rather than cutting production steadily across the period, Norwegian production cuts were concentrated in the last month of each quarter, i.e., March and June. A preliminary estimate of crude



oil production for the first half of 2002 is 3.06 million barrels per day. In June, it was announced by the Oil and Energy Ministry that "The Norwegian government has decided not to extend the restriction on oil production into the second half of 2002." By this time, Brent prices were some \$5 per barrel higher than they had been in November 2001. In late June, Norway informed operators that they could produce at 13% above field production limits in an effort to reach a government target of 3.02 million bbl/d of crude oil for 2002.

Oil service workers struck from July 5 until August 10, when the Norwegian oil industry association (OLF) and oil union Nopef arrived at a new agreement covering 3500 employees in oil service companies. The oil industry reportedly suffered a loss of more than Nkr 330 million (\$42.2 million) during the strike. A strike began September 10, 2002 by dock workers at Statoil's 205,000-barrels-per-day refinery in Mongstad, Norway, that would curb exports from one of Europe's key gasoline-producing plants. The strike could curb crude production from Norsk Hydro's Troll B and C platforms, which send their output to the terminal at the Mongstad refinery via pipelines.

### **Oil Sector Restructuring**

The Norwegian oil sector has undergone massive restructuring during the past few years. Norway's oil sector had been characterized by extensive public ownership. Its largest oil company, Statoil, was 100% state-owned, while Norsk Hydro, the second largest oil company, was majority state-owned. The only completely privately-held company was Saga Petroleum. In addition, state-owned Statoil managed another entity even larger than itself, the State Direct Financial Interest (SDFI), which represented the state's holdings in 150 offshore oil and natural gas fields and about 40% of total production.

In late 1999, Norsk Hydro completed its acquisition of Saga, reducing its public ownership, originally 51%, to 44%. In April 2001, the Norwegian parliament approved plans to sell between 10% and 25% of Statoil to private investors and to sell 15% of the SDFI to Statoil prior to Statoil's listing on the New York and Oslo stock exchanges. Norsk Hydro (taking the largest share) and eight other Norwegian North Sea operators were sold another 6.5% of the



SDFI in March 2002. The remainder of the SDFI (78.5%) was reorganized into a new state company called Petoro. Petoro is the world's fifth largest oil and gas firm in terms of production, with estimated production of 1.4 million bbl/d of oil, though Petoro functions entirely as a management company, having no operations itself. Statoil completed its purchase of 15% of the SDFI in May 2001 for \$4.24 billion, and on June 18, 2001, Norway sold 17.5% of its holding in Statoil in an initial public offering for \$2.9 billion. These changes should introduce more efficiency into the system, as Statoil was uncompensated for managing the SDFI, and raise more capital for Statoil in order for it to compete globally as the company explores regions such as offshore west Africa and Venezuela.

Norsk Hydro sold two production licenses to Marathon Oil of the United States in July. There is speculation that Norsk Hydro may spin off its oil unit to focus on its aluminum and fertilizers businesses. Statoil is the most likely buyer, which would create a company with production approaching 1 million bbl/d of crude, condensate, and natural gas liquids. Statoil announced in May 2002 that it is selling its 7,000 bbl/d assets in the Danish North Sea to Denmark state oil company DONG for \$127 million in order to concentrate on core areas.

## **Oil Production**

Norway's major Norwegian North Sea production areas include: Ekofisk, Sleipner, Frigg, Statfjord, and Oseberg and Troll. There are also five fields producing in the Norwegian Sea. (The 62nd line of latitude separates the North Sea and the Norwegian Sea.)

Norwegian oil investment was about Nkr 56.9 billion (\$7.5 billion) in 2001, an increase from the \$6.2 billion invested in 2000, but down from the peak of Nkr 80 billion (\$10.6 billion) in 1998. Investment levels reflect expectations that Norway's oil production will remain roughly constant until 2004, and then begin a gradual decline. Oil fields and projects under development include: Fram West, Grane, Tune, and the Valhall Flanks and water injection. Three new offshore oil fields came on stream in the second half of 2001:

Tambar, Glitne, and Huldra. Some important oil discoveries offshore Norway in the past 12 months include: Staerne, near the Norne field, with estimated reserves of 30 million barrels; increased reserves in the Oseberg unit; and additional oil at the Goliat continental oil shelf in the Barents Sea (estimates of 75-107 million barrels increased to 91-250 million barrels). Overall, about 250 million barrels of oil and condensate were added to Norwegian reserves in 2001. A total of 32 blocks were offered at the 17th Norwegian Continental Shelf licensing round in June 2002. Eleven companies will share blocks that comprise six production licenses. This round focused on the Norwegian Sea.

Ekofisk, in the southern North Sea sector, was the first North Sea oil field to be discovered, in the late 1960s, and developed, with production beginning in 1971. Since 1975, oil has been piped from Ekofisk to the UK (Teesside, England). There are currently 29 platforms installed in the area, some of which are in the British North Sea. The most recent phase of development began in 1994, when the Phillips group (the U.S. company that leads the Ekofisk operating consortium, which includes TotalFinaElf, Norsk Agip, Norsk Hydro, and Statoil) installed two new platforms at "Ekofisk II". Ekofisk II came onstream in August 1998. The Phillips license runs through 2028. In December 2001, it was decided by the government that Phillips would remove 14 of the 29 Ekofisk platforms between 2003 and 2018, at an estimated cost of \$1 billion (Nkr 8 billion). About 10% of the removal cost will be paid by Phillips, 72% by the Norwegian government, and the remainder will be paid by the other members of the consortium. Phillips plans to bring the steel structures and the topside of the concrete Ekofisk tank ashore for recycling, to leave the rest of the concrete tank and barrier wall in place, and also to leave about 150 miles of pipelines buried. Ekofisk's production (including Eldfisk, Embla, and Tor) is expected to be about 381,000 barrels per day of crude oil in 2002. The Valhall field's production continues to decline, with expected production in 2002 at 72,000 bbl/d. However, the recently approved Valhall water injection and the Valhall flanks should improve recovery from the field. The Yme field has ceased production.

Sleipner West was discovered in 1974, but Sleipner East went into production first, in 1993. Sleipner West is tied back into Sleipner East, and the fields share the same operations organization. Sleipner is mostly important for natural gas production, including liquids and condensate (2002 condensate production in East and West is estimated at 3.7 million cubic meters), but the Varg field is estimated to produce 8,300 bbl/d crude oil in 2002. Varg is scheduled to cease production within the next few years.

Moving to the northern North Sea sector, the Frigg-Heimdal area is also mostly important as a natural gas producing area, though the Balder and Jotun fields together are expected to produce about 124,000 bbl/d of crude oil in 2002. Balder was proven as early as 1967, though production did not commence until 1999. Shuttle tankers are loaded from a production ship tied to subsea-completed wells. Several structures close to Balder are being developed by Ringhorne platform. Jotun also commenced production in 1999, from a floating production, storage, and offloading vessel (FPSO) that is serviced by shuttle tankers.

The Statfjord area is one of the largest oil producing areas in the North Sea. The Statfjord field itself was discovered by Mobil in 1974, and it extends into the British North Sea. Production began from Statfjord A in 1979, from Statfjord B in 1982, and from Statfjord C in 1985. Production from the Statfjord North and Statfjord East subsea installations are tied back into Statfjord C. Statoil took over the operations from Mobil in 1987. Three large concrete platforms with storage cells have been installed on Statfjord. Britain's 14.5% share goes by pipeline via the Brent field to Scotland. Statfjord's production has exceeded the most optimistic expectations, but all Statfjord fields are now in decline. Norway's share of Statfjord crude oil production in 2002 (including North and East) is expected to be 205,000 bbl/d. Statfjord should continue producing until 2020.

The Snorre field, with production rising, has become the largest single field in the area, with 2002 production estimated to be 228,000 barrels per day. It was discovered in 1979, and production commenced in 1992 (see above).

Norway's third largest field is Gullfaks, which, including West and South, is expected to produce 223,000 bbl/d in 2002. Gullfaks (including West) has declined by over 50% since its peak in 1995, but Gullfaks South (including Rimfaks and Gullveig) has had increasing production since it came online in 1998, to 70,000 bbl/d expected for 2002. Vigdis continues to decline from its peak in 1999, but Visund, which is east of Snorre, has had its production increase, with 2002 expected to be 43,000 bbl/d.

The various Oseberg fields (Oseberg, East, South, West) together are the largest oil producing fields in their area, whereas Troll is the largest gas field in the area. Oseberg began production in 1988, and peaked at about 500,000 bbl/d in 1996, and has declined since to about 176,000 bbl/d (including West), far below the capacity of the three platforms there. The surrounding East and South Oseberg fields have come online in 1999 and 2000, respectively, supplementing the declining production at Oseberg with 130,000 bbl/d expected for 2002. Both East and South peaked in 2001. There is a pipeline from Oseberg to the Sture terminal on the Norwegian coast, with tie-backs from East and South to Oseberg. A thin layer of oil underlies the entire Troll field, but it is only sufficiently thick for commercial recovery in the Troll West region. This is where Troll Phase II is expected to produce 316,000 bbl/d in 2002 - production has been relatively flat since 2000, though Troll achieved a daily record of 440,000 bbl in May 2002. There is a pipeline from Troll West to the Mongstad crude oil terminal on the Norwegian coast.

The Norwegian Sea has seen production increase at a higher rate than North Sea production in recent years, though it is in an earlier stage of development, the first field having come on stream in 1993. Total production for the area for 2002 is predicted to be 725,000 bbl/d. Much of the increase comes from the new Asgard field, which went into production in 1999, and now produces about 148,000 bbl/d. Norne's production also increased in 2001, though a slight decline is predicted for 2002. Heidrun's production has declined to less than that of the Norne field. Draugen's production has been flat in the past two years, but it is still has the highest production at about 200,000 bbl/d. Shuttle tankers are used to take oil from the platforms or production ships, as there is



currently not an oil pipeline from the Norwegian Sea.

## **NATURAL GAS**

Norway holds 44 trillion cubic feet (Tcf) of natural gas reserves. Norway is not a major natural gas consumer, although its consumption is expected to increase in coming years as natural gas-fired power plants come online. It is estimated that just 16% of Norway's gas reserves have been extracted since output began, though Norway produced more gas than it discovered for the first time in 2001, as the increase in reserves was between 700-900 billion cubic feet (Bcf). Natural gas accounts for about 60% of Norway's overall offshore hydrocarbon reserves and is expected to account for an increasing portion of Norway's energy exports. Norway continues to be the second-largest natural gas exporter in Europe, with its growth outpacing that of Europe's largest natural gas exporter, Russia. Exports are forecast to be between 1.9-2.3 Tcf in 2002. Export volumes peaked at about 6.7 Bcf per day in the second quarter of this year, but will have to decline slightly if the forecast is correct. Norway's sub-sea natural gas export network is capable of transporting about 3 Tcf per year.

### **Natural Gas Exports**

Norway, as a member of the European Economic Area (EEA), is bound by certain EU economic directives, and the EU recently has forced Norway to restructure the way it sells natural gas to other European countries. Prior to June 1, 2001, all Norwegian gas was sold through the Gassforhandlingsutvalget (GFU, meaning Gas sales negotiating committee). Although ownership of Norway's gas is held by many different companies and formerly the SDFI, now Petoro, the GFU consisted of just Norsk Hydro and Statoil. The GFU would set a price for all Norwegian gas available for purchase, instead of letting the various producers compete against each other. The EU claimed that this violated fair trading practices and threatened Statoil and Norsk Hydro with huge fines. In July 2002, Norway and the European Commission resolved this long-running dispute over the legality of long-term contracts negotiated by the defunct Gas Sales Negotiating Committee (GFU). The European Commission had threatened to take legal action against Statoil



and Norsk Hydro because long-term contracts already in place that account for about 20% of western Europe's gas imports were negotiated by means of the GFU and because many of these contracts have destination clauses (prohibition of resale). Under the negotiated deal, the Commission relented on its demand to have the long-term contracts revised in return for Statoil and Norsk Hydro agreeing to sell 530 Bcf over a four-year period to new European customers (customers without GFU-era contracts). In May 2002, most natural gas exporting companies agreed to coordinate ownership of their pipeline assets through shares in the new government-backed Gas-Led company. The state-owned company Gassco is the operator on all of Norway's natural gas pipelines (since January 1, 2002), as the partial privatization of the former operator, Statoil, created a conflict of interest.

The effects of all these changes are yet to be seen, though the expectation is that the price of Norwegian natural gas will be reduced, at least in the short to medium run. A major constraint for upstream gas companies competing for sales in the newly deregulated market will be limited infrastructure to take the gas out, because various companies share the same pipeline. Norwegian gas arrives in Europe through the following trunklines: the Europipe I and Statpipe/Norpipe systems to Germany; the Zeepipe trunkline to Zeebrugge in Belgium; the NorFra line to Dunkerque in northern France; and the Europipe II line from Kårstø north of Stavanger to Emden. These Norwegian trunklines provide a combined gas transport capacity of 2.7 Tcf per year. There are also pipelines to the UK, including the new Vesterled pipeline, which opened in October 2001, with volumes at about 138 million cubic feet per day. Marathon is exploring the potential demand for its proposed Symphony natural gas pipeline, which would bring additional Norwegian natural gas to the UK through a link between the Heimdal complex and the Brae/Miller complex in the UK sector.

Statoil expects Norway's share of natural gas deliveries to continental Europe to rise from 14% in 1996 to 20% by 2005. The following companies currently buy Norwegian gas: Ruhrgas, BEB, Meeg, Thyssengas and Verbundnetz Gas (Germany), Gaz de France (France), Gasunie, SEP (the Netherlands),

Distrigaz (Belgium), Enagas (Spain), Austria Ferngas, OMV (Austria), Snam (Italy), Energia (Italy), Polish Oil and Gas Company (Poland), Transgas (Czech Republic), and Centrica (UK). Germany is the largest natural gas market in continental Europe, and about 20% of the gas that Germany currently consumes comes from Norway. Ruhrgas expects Norway to supply 30% of Germany's imports. About half of the gas from the NorFra line transits through France to points in Italy and Spain, while the other half is consumed in France. By 2005, this pipeline is expected to supply one-third of France's total gas consumption.

In July 2001, Stoltenberg and Polish Prime Minister Jerzy Buzak signed a joint declaration for the deliveries of 177 billion cubic feet (Bcf) of natural gas from Norway annually. Existing Polish infrastructure cannot support significant imports from non-Russian sources, so a pipeline across the Baltic through either Sweden or Denmark was being planned, but it now appears unlikely that a natural gas pipeline to Poland will be built because of insufficient demand volumes. There is a competing plan to import liquefied natural gas (LNG) from Norway to a planned LNG terminal on Poland's Baltic Coast. Norway began piping a relatively small amount of gas through Germany in October 2000, based on an earlier contract signed in May 1999, for the delivery of 17.7 Bcf annually, under an agreement between Germany's Ruhrgas and Verbundnetz Gas and Poland's state-held gas monopoly.

The United Kingdom, the largest natural gas market in Europe, will also soon become an importer of Norwegian gas again. Norway had once supplied up to a quarter of British demand in the 1980s, but this dwindled as the Frigg field that supplied the gas was depleted. Vesterled will connect the existing Frigg pipeline with the Heimdale platform, which is already connected by pipeline to the Sleipner gasfields, and from there to other areas of the Norwegian North Sea such as the Ormen Lange gasfield that is scheduled to come on stream in 2006. In July 2001, BP announced a 15-year contract to buy 56.5 Bcf natural gas per year from Statoil. In June 2002, Centrica of the UK signed a 10-year deal with Statoil for the purchase of 483.5 million cubic feet per day, with prices linked to natural gas rather than oil.

## Natural Gas Production

The Troll field (East and West) contains over half of Norwegian natural gas reserves and, as Norway's largest natural gas field, Troll produces over 72 Bcf per month. It has a production capacity of 100 million cubic meters (3.5 Bcf) per day, and estimated production in 2002 is expected to be 22.8 billion cubic meters (805 Bcf). The Troll Gas development Phase I in Troll East comprises the Troll A platform, the gas treatment plant at Kollsnes near Bergen, and pipelines linking these two installations. Troll East is thought to contain two-third's of Troll's natural gas reserves. Phase III (under development) will extract gas from Troll West. Troll A is the tallest structure ever moved by humans. Its concrete gravity base structure has been built for a lifetime of 70 years. The division of roles on the field has been controversial. Currently, Statoil and the new Petoro have about three-quarters of the shares and Statoil is the operator, followed by Norsk Hydro, Shell, TotalFinaElf, and Conoco. The gas is taken by the Zeepipe to Zeebrugge and Statpipe/Norpipe to Emden.

Troll is not the only active natural gas field in Norway's North Sea. Gas sales began in 1977 from Ekofisk and Frigg. Ekofisk, in the southern North Sea sector, supplies Ruhrgas, Gaz de France, Gasunie and Distrigaz. Ekofisk has declined from its peak in the late 1970s and a production spike in the 1990s, though it is still expected to produce 5.95 billion cubic meters (210 Bcf) in 2002. Frigg production is sold to British Gas, though Frigg has declined to the point that production is expected to cease sometime this year. Nearby Heimdal's declining production is also set to cease this year. Agreements on selling gas from Statfjord, Gullfaks and Heimdal were signed in 1981 and deliveries began in 1985 to Ruhrgas, BEB, Thyssengas, Gaz de France, Gasunie, Distrigaz, Elf and Meeg. Remaining commitments under these deals average six billion cubic meters per year (212 Bcf). Sleipner, East and West, is expected to produce 13.6 billion cubic meters (479 Bcf) in 2002; this gas is currently sold under the Troll gas sales agreements. Though Sleipner East is declining, most natural gas production is from Sleipner West, which continues to have sharply increasing production. The Norwegian share of gas from the field is piped through the Statpipe/Norpipe system to Emden in

## Germany via Kårstø, north of Stavanger.

Huldra commenced production with an unmanned platform in November 2001, with natural gas production steadily rising and already at about 350 million cubic feet per day (total expected production 3.19 billion cubic meters or 113 Bcf for 2002). Huldra also produces condensate and about 28,000 bbl/d of crude oil. The crude and condensate are piped to Veslefrikk B, and the gas is piped to Heimdal.

The Åsgard field on the Halten Bank in the Norwegian Sea is one of Norway's most important new projects. The field has been developed as a chain of four interconnected projects: development of Åsgard itself, construction of the Åsgard Transport gas trunkline from the field to the Kårstø gas treatment plant north of Stavanger, the Kårstø development project, and the Europipe II gas trunkline from Kårstø to Dornum in northern Germany. Gas production from the floating platform began in October 2000, and is expected to be 8.9 billion cubic meters (314 Bcf) in 2001. Statoil is the operator of the project, which is one of Norway's giant offshore developments, on par with Ekofisk and Troll. Subsea production installations in the field are planned to be the most extensive in the world, embracing a total of 51 wells grouped in 17 seabed templates. It will link the Halten Bank area to Norway's gas transport system in the North Sea.





Statoil now is developing the Halten Bank South area of the Norwegian Sea, having taken over as operator in January 2000 (Saga had been the operator). Recoverable reserves of the Halten Bank South fields are estimated

at 140 billion cubic meters (almost 5 Tcf) of gas and about 440 million barrels of oil and condensate - on par with Åsgard. The Kristin field of the Halten Bank has already secured sales of up to 31 billion cubic meters (1.1 Tcf) from 2005 to 2016. ExxonMobil made the largest discovery of 2000 in this area, the Bella Donna field, with estimated reserves between 60 and 125 billion cubic meters (2.1-4.4 Tcf).

In March 2002, the Norwegian parliament approved Statoil's plans to develop the \$5 billion Snohvit project. If it is completed, Snohvit will be the largest sub-sea liquefied natural gas (LNG) project in the world, as well as the most northerly as it is located in the Barents Sea. Approximately 201 Bcf per year of natural gas would be piped to the coast, liquefied, and transported to customers in Spain and the United States by means of four carriers. In June 2002, El Paso of the United States, announced that it had final Norwegian and U.S. government approval for its plans to import 1.8 million metric tons of LNG to the United States from Snohvit. This is over 40% of the project's capacity, and much of the LNG may be delivered to El Paso's Cove Point, Maryland regasification facility. Construction of Snohvit restarted in June as well.

The huge Ormen Lange field in the Norwegian Sea, Norway's second largest natural gas discovery with estimated reserves of 14.1 Tcf, has its blocks divided into three production licenses, with the unusual characteristic that Statoil/SDFI has only a 30% share of one of the licenses, such that non-Norwegian companies are the majority owners of one of the licenses. Norsk Hydro is the operator in the development phase, and Shell will be the operator in the production phase. Gas production is planned to commence in 2007.

## **COAL**

Norway's coal production occurs on Spitsbergen of the Svalbard Islands, off the country's northern coast. This island also has Norway's only coal-fired power plant. In December 2001, the Norwegian Parliament voted to give a \$16.9 million subsidy to state-owned coal monopoly Store Norske Svalbard Kulkompani. Mining in Svalbard will be expanded and eventually, coal exports are planned. However, Norway is currently a net importer of coal, though overall consumption is small at 1.57 million short tons in 2000.

## **ELECTRICITY**

In 2000, 99% of Norway's electricity generation came from its 27 million kilowatts of installed hydroelectric capacity. Norway has one of the highest rates of per-capita consumption of electricity in the world. In December 2001, state-owned Norwegian electricity company Statkraft purchased independent electricity company Trondheim Energiverk for \$483 million. This makes Statkraft the second-largest electricity supplier in Scandinavia and gives the company over 50% of the Norwegian electricity market. Prime Minister Stoltenberg declared, in January 2001, that "the era of large-scale new hydropower is over" and that several large new hydro projects are to be abandoned, including Beiarn, Bjollaga, and Melfjord. A new hydro plant with greater capacity is being constructed to replace the existing one at Tyin.

Norway is planning to construct three new natural gas-fired power plants. Construction of two natural gas-fired power plants by Naturkraft appears set to go ahead sometime this year. Naturkraft recently asked the government to extend its license to build these plants beyond 2004. This issue, which has not



been completely resolved, is extremely important in Norway, as Prime Minister Bondevik's previous term of office ended in a vote of no confidence that overrode his opposition to the plants. Industrikraft Midt-Norge also plans to build a natural gas-fired plant, and has an allowance to emit 2.2 million tones of carbon dioxide per year. This 2X400 gas-fired combined heat and power plant in Skogn, central Norway is slated to begin construction in 2002. U.S.-based Mirant has bought 40% of five-member industrial consortium IMN, which will build, operate, and own the plant.

Norway has had a surplus of hydroelectric power in the past two years, but in drier years it must import electricity. In January 2001, E.On of Germany, Statkraft, and Elsam of Denmark agreed to free up capacity on key power cables linking the high tension electricity grids of Scandinavian countries to Germany, including the Skaggerrak cable, the only cable connecting western Denmark and Norway.

In May 2002, the European Free Trade Area (of which Norway is a member) informed the government that industry's exemption from taxation on electricity cannot continue. Consumers currently pay a 9% tax on electricity.

## **ENVIRONMENT**

Norway is a proponent of "green power" from renewable sources and has made efforts to make its oil sector as environmentally friendly as possible. Under its Kyoto Protocol commitment, Norway has agreed to limit its carbon emissions to a 1% increase from 1990 levels by the 2008-2012 commitment period. In a dual effort to meet its Kyoto target and to further develop technologies to make oil and gas production less environmentally damaging, Norway has been a leader in alternatives for reducing carbon emissions. As a result of high activity in the oil and gas extraction sectors, Norway is relatively more energy-intensive than most OECD countries, and possesses one of the highest per capita energy consumption levels in the world. Air pollution in Oslo is not as severe as in other major world cities.

*Sources for this report include: Economist Intelligence Unit, Financial Times, Hart's European Petroleum Finance Week, International Monetary Fund (IMF), Oil Daily, Norwegian Ministry of Oil and Energy, Petroleum Economist, Petroleum Intelligence Weekly, Platt's Oilgram News, Statoil, The Scotsman, DRI-WEFA, World Markets Energy .*

## **COUNTRY OVERVIEW**

**Head of State:** King Harald V

**Prime Minister:** Kjell Magne Bondevik (since October 2001)

**Independence:** October 26, 1905 (from Sweden)

**Population (2001E):** 4.5 million

**Location/Size:** Northern Europe, bordering the North Sea and the North Atlantic Ocean, west of Sweden/123,843 square miles (slightly larger than New Mexico)

**Capital City:** Oslo

**Language:** Norwegian (small Lapp- and Finnish-speaking minorities)

**Ethnic Groups:** Germanic (Nordic, Alpine, Baltic), Lapps (Sami) 20,000

**Religions:** Evangelical Lutheran 87.8% (state church), other Protestant and Roman Catholic 3.8%, none 3.2%, unknown 5.2%

**Defense (8/98):** Army, 28,900; Navy, 6,100; Air Force, 6,700 (including 16,500 conscripts)

## **ECONOMIC OVERVIEW**

**Finance Minister:** Per-Kristian Foss

**Minister of Trade and Industry:** Ansgar Gabrielsen

**Currency:** Norwegian Krone (NKR)

**Exchange Rate (9/09/02):** 1 US Dollar = 7.52 Kroner

**Gross Domestic Product (GDP, 2001E):** \$163.7 billion

**Real GDP Growth Rate (2001E):** 1.4% **(2002F):** 2.3%

**Inflation Rate (consumer prices, 2001E):** 3.0% **(2002F):** 1.5%

**Unemployment Rate (2001E):** 3.6% **(2002F):** 4%

**Merchandise Exports (2001E):** \$58.6 billion

**Merchandise Imports (2001E):** \$33.6 billion

**Merchandise Trade Surplus (2001E):** \$25 billion

**Major Trading Partners:** UK, Germany, Sweden, Denmark, United States, other EU members

**Major Exports:** Fuels and other energy products; food and beverages; manufactured materials

**Major Imports:** Machinery and transport equipment, miscellaneous manufactures, food, beverages, and tobacco

## ENERGY PROFILE

**Minister of Petroleum and Energy:** Einar Steensnaes

**Proven Oil Reserves (1/1/02E):** 9.4 billion barrels

**Oil Production (2001E):** 3.4 million barrels per day (bbl/d), of which 3.1 million bbl/d was crude oil

**Oil Consumption (2001E):** 0.2 million bbl/d

**Net Oil Exports (2001E):** 3.3 million bbl/d

**Crude Oil Refining Capacity (1/1/02E):** 310,000 bbl/d

**Natural Gas Reserves (1/1/02E):** 44 trillion cubic feet (Tcf)

**Natural Gas Production (2000E):** 1.81 Tcf

**Natural Gas Consumption (2000E):** 0.087 Tcf

**Net Natural Gas Exports (2000E):** 1.7 Tcf

**Electrical Generation Capacity (1/1/00E):** 27.2 gigawatts

**Electricity Generation (2000E):** 141 billion kilowatthours (bkwh)

**Electricity Consumption (2000E):** 112 bkwh

**Recoverable Coal Reserves (12/31/99E):** 1 million short tons (Mmst)

**Coal Production (2000E):** 0.55 Mmst

**Coal Consumption (2000E):** 1.57 Mmst

**Major Systems:** Statfjord, Oseberg, Gullfaks, Ekofisk

**Major Companies:** BP, ConocoPhillips, ExxonMobil, TotalFinaElf, Norsk Hydro, Shell, Statoil, Chevron, Petoro

## ENVIRONMENTAL OVERVIEW

**Minister of Environment:** Borge Brende

**Total Energy Consumption (2000E):** 1.8 quadrillion Btu\* (0.5% of world

total energy consumption)

**Energy-Related Carbon Emissions (2000E):** 10.3 million metric tons of carbon (0.2% of world total carbon emissions)

**Per Capita Energy Consumption (2000E):** 399.6 million Btu (vs. U.S. value of 348.9 million Btu)

**Per Capita Carbon Emissions (2000E):** 2.3 metric tons of carbon (vs. U.S. value of 5.7 metric tons of carbon)

**Energy Intensity (2000E):** 10,619 Btu/\$1995 (vs U.S. value of 10,390 Btu/\$1996)\*\*

**Carbon Intensity (2000E):** 0.06 metric tons of carbon/thousand \$1995 (vs U.S. value of 0.17 metric tons/thousand \$1996)\*\*

**Sectoral Share of Energy Consumption (1998E):** Industrial (52.1%), Residential (21.7%), Transportation (13.1%), Commercial (13.1%)

**Sectoral Share of Carbon Emissions (1998E):** Industrial (57.0%), Transportation (37.9%), Residential (2.6%), Commercial (2.5%)

**Fuel Share of Energy Consumption (2000E):** Oil (21.9%), Natural Gas (5.3%), Coal (2.2%)

**Fuel Share of Carbon Emissions (2000E):** Oil (72.7.1%), Natural Gas (16.7%), Coal (10.6%)

**Renewable Energy Consumption (1998E):** 1,248 trillion Btu\* (5% increase from 1997)

**Number of People per Motor Vehicle (1998):** 2.0 (vs. U.S. value of 1.3)

**Status in Climate Change Negotiations:** Annex I country under the United Nations Framework Convention on Climate Change (July 9th, 1993).

Signatory to the Kyoto Protocol (signed April 29th, 1998- not yet ratified).

Under the Protocol, Norway has agreed to a 1% increase from 1990 emissions levels of a basket of greenhouse gases.

**Major Environmental Issues:** Water pollution; acid rain damaging forests and adversely affecting lakes, threatening fish stocks; air pollution from vehicle emissions.

**Major International Environmental Agreements:** A party to Conventions on Air Pollution, Air Pollution-Nitrogen Oxides, Air Pollution-Sulphur 85, Air Pollution-Sulphur 94, Air Pollution-Volatile Organic Compounds,

Antarctic-Environmental Protocol, Antarctic Treaty, Biodiversity, Climate Change, Desertification, Endangered Species, Environmental Modification, Hazardous Wastes, Law of the Sea, Marine Dumping, Nuclear Test Ban, Ozone Layer Protection, Ship Pollution, Tropical Timber 83, Tropical Timber 94, Wetlands and Whaling. Has signed, but not ratified: Air Pollution-Persistent Organic Pollutants.

\* The total energy consumption statistic includes petroleum, dry natural gas, coal, net hydro, nuclear, geothermal, solar, wind, wood and waste electric power. The renewable energy consumption statistic is based on International Energy Agency (IEA) data and includes hydropower, solar, wind, tide, geothermal, solid biomass and animal products, biomass gas and liquids, industrial and municipal wastes. Sectoral shares of energy consumption and carbon emissions are also based on IEA data.

\*\*GDP based on EIA International Energy Annual 2000

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## LINKS

For more information from EIA on North Sea, please see:

[EIA - Country Information on Norway](#)

Links to other U.S. government sites:

[CIA World Factbook - Norway](#)

[U.S. Department of Energy's Office of Fossil Energy's International section - Norway](#)

[U.S. State Department Consular Information Sheet - Norway](#)

[U.S. State Department Background Notes - Norway](#)

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[Statoil](#)

[Norsk Hydro](#)

[Ministry of the Environment](#)

[Statkraft](#)

[International Energy Agency Norway 1997 Review](#)

[The Washington Times International Supplement on the North Sea](#)

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File last modified: September 9, 2002

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# United Kingdom

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[Coal](#)

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[Environment](#)

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*September 2001*

## United Kingdom

*With its significant North Sea reserves, the United Kingdom is a major European oil and natural gas producer. It is also one of the largest energy consumers in Europe.*

*Information contained in this report is the best available as of September 2001 and is subject to change.*



### BACKGROUND

The United Kingdom (official name: United Kingdom of Great Britain and Northern Ireland, abbreviated: UK) is a major political and economic world power and a close ally of the United States. It is also the world's fourth-largest economy. The country joined the European Union (EU) in 1973 (confirmed by referendum in 1975), but has no plans to join the common European currency, the euro, in the immediate future. Despite the UK's lack of participation in the euro, the country has continued to attract foreign direct investment (FDI) - about \$517 billion total at the end of 2000, second in the world after the United States. The UK is an even larger exporter of capital - outward FDI at the end of 2000 totaled \$902 billion, also second to the United States. The UK maintains a smaller public sector than many of its EU counterparts.

The UK, like most of the OECD, has seen growth rates decline in 2001. GDP growth in the UK is expected to decline to 2% in 2001, and will decline further still if the economy of the United States approaches a mild recession, as the UK economy is the second-closest linked to that of the United States of all the countries of the EU. This slowdown is also expected to decrease external demand, raising the trade deficit for 2001. Despite this, unemployment fell to a 26-year low in July 2001.



Given low inflation (under the government's target of 2.5% for 28 consecutive months) and the prospect of slackening growth (especially in the manufacturing sector), the Bank of England has cut interest rates four times in 2001, most recently in

August.

The United Kingdom is by far the largest petroleum producer and exporter in the EU (Norway is not a member of the EU). It also is the largest producer and an important exporter of natural gas in the EU. Most of the UK's oil and gas reserves and production are located off the coast of Scotland, with the Scottish city of Aberdeen considered to be the oil and gas capital of the United Kingdom. The International Petroleum Exchange (IPE), the second-largest energy futures exchange in the world, is located in London. The second and third-largest publicly traded energy companies in the world in terms of market value, Royal Dutch/Shell and BP, respectively, are based in the UK (Royal Dutch/Shell is also based in the Netherlands). Because major UK energy companies are private, the imminent decline in British oil and gas production most likely will translate to an increase in UK companies' involvement abroad, mitigating the effect in the overall UK economy, though Scottish employment is particularly sensitive to North Sea production levels. The oil and gas industry represented about 12% of industrial capital investment, and 2% of total capital investment in 2000. The energy industry overall represents about 4% of GDP. The UK has high taxes on petroleum products, making for among the highest prices in the EU. High fuel prices caused protests and blockades in September 2000.

In July 1999, a Scottish Parliament met for the first time in almost 300 years. "Devolution" gives the Scottish Parliament the ability to tax its own citizens, plus jurisdiction over local issues such as education, health, transport, and agriculture. It has no effect on the economic and industrial structure of the United Kingdom, which remains a single market. Devolution has had no effect on North Sea oil and gas.

### **North Sea Oil and Gas**

North Sea oil and gas reserves were first discovered in the 1960s. The North Sea did not emerge immediately as a key non-OPEC oil producing area, but North Sea production grew as major discoveries continued throughout the 1980s and into the 1990s. Although the region is a relatively high cost producer, its high quality crude oil, political stability, and proximity to major European consumer markets have allowed it to play a major role in world oil and gas markets.

Many of the world's major crude oil prices are linked to the price of the North Sea's Brent crude oil. (Brent crude is a blend of North Sea crude oils and does not come exclusively from the Brent field.) Because Brent crude is traded on the International Petroleum Exchange in London, fluctuations in the market are reflected in the price of Brent. Therefore, all other crude oils linked to Brent can be priced according to the latest market conditions. Brent production is forecast to fall precipitously from its current 450,000 bbl/d by 2005, but discussions are reported to be underway on building a pipeline spur from the Statfjord system to the Shell-run Brent pipeline to Sullom Voe. The increased throughput would support trade in the increasingly dated Brent price marker, extending its life as a price marker and reducing volatility in the 15-day Brent forward market, where liquidity has fallen to about 10 cargoes per delivery month compared with 300-400 deals per month in the early 1990s.

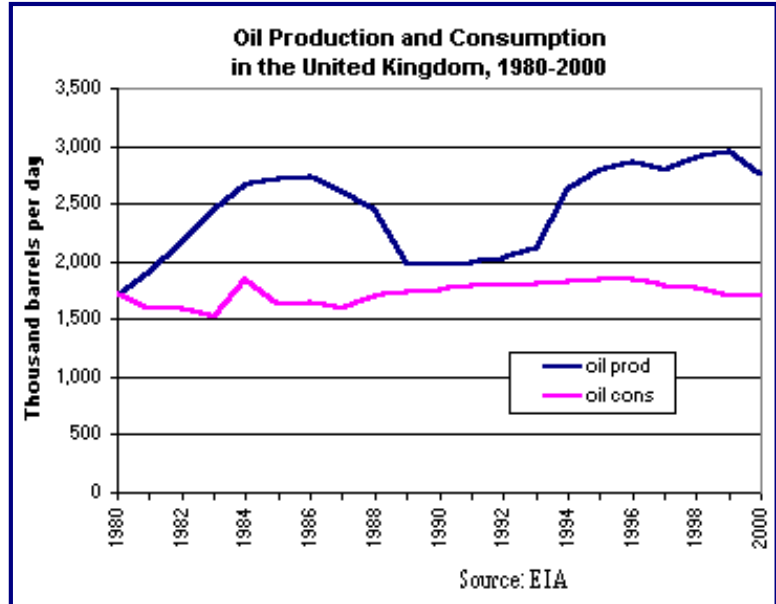
The North Sea is considered a "mature" area, with few large discoveries likely to be made. Only a few frontier areas hold the possibility of further discoveries of large oil and gas fields. In both of the major North Sea producing nations, Norway and the UK, government and industry are taking steps to restructure their oil and gas sectors to make them more internationally competitive.

### **OIL**

The UK holds about 5 billion barrels of proven oil reserves, almost all of which is located in the North Sea. Most of the country's production comes from basins east of Scotland in the central North Sea.

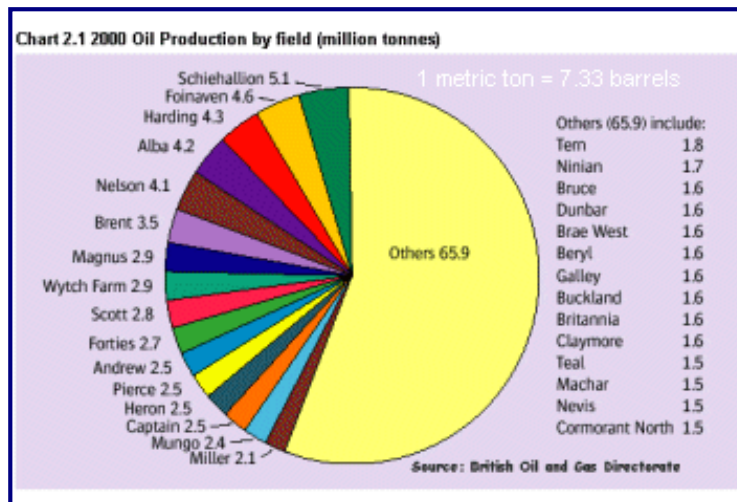
The northern North Sea (east of the Shetland Islands) also holds considerable reserves, and smaller deposits are located in the North Atlantic Ocean, west of the Shetland Islands. There are over 100 oil and gas fields currently onstream, and several hundred companies are active in the area. In 2000, the United Kingdom's production declined to 2.75 million barrels per day (bbl/d), down from a historical high of 2.95 million bbl/d in 1999. Production is expected to decline by 85,000 bbl/d in 2001. Most of the UK's crude oil production ranges in gravity from 30° to 40° API. Most high quality crude is exported, while cheaper, lower quality (mainly from the Middle East) crude oils are imported for refining. Unit costs for UK oilfields averaged just above \$15 per barrel in 2000, though fields that started production in the 1990s have lower costs.

The domestic UK oil and gas industry is expected to decline as reserves are depleted in the coming decade. The British Oil and Gas Industry Task Force was set up in 1998 to bring together government departments and oil and gas industry representatives (the oil and gas industry is 100% in the hands of the private sector) to discuss the future of the industry. A successor body to the Task Force, known as "PILOT", now has been created to oversee the execution of Task Force recommendations and future developments. Government and industry are interested in collaborating to facilitate a "gentle decline" in British North Sea production, a component of which involves shifting focus from small numbers of very large projects to larger numbers of smaller projects.



## Production

The number of fields under development or in production in the UK at the end of 2000 was 264. Just two fields ceased production, Bladen and Blenheim. Oil production from six offshore fields commenced in 2000: Bittern, Cook, Guillemot West, Guillemot North West, Shearwater (condensate), and Keith. In 2001, as of July, four new offshore oil fields were approved for development by the British Oil and Gas Directorate: Halley, Hannay, Kestrel, and Otter; and the Angus field was approved for redevelopment.



In December 2000, the British government gave approval to four new projects that will result in \$1.5 billion in new investment in the British North Sea: (1) a £320 million gas pipeline from the Shetland Islands to the Magnus oil field that takes surplus gas from Sullom Voe oil terminal on the Shetland Islands to be reinjected for enhanced recovery in the Magnus field; (2) a floating platform to drill for oil in the Leadon field which was discovered in 1979, but so far undeveloped, that is expected to yield 50,000 bbl/d of oil equivalent (see below); (3) further development by BP of

the Foinaven oil field; and (4) Ranger Oil's (subsidiary of Canadian Natural Resources Limited) production in the Kyle field, which started in April 2001 at 7,000 bbl/d, in addition to gas production. Total investment spending in the UK continental shelf in 2000 was about £3 billion, though continued high oil prices make it likely that investment will increase for 2001. Most new developments will be subsea, using existing infrastructure, instead of new platforms.

As noted above, production commenced in April 2000 from the Bittern, Guillermot West, and Guillermot North West fields by means of the Amerada-Hess operated Triton FPSO. About 78% of the content is British, and the three fields have reserves of about 140 million barrels of oil and 180 billion cubic feet (Bcf) of gas. Expected field life is 13 years and daily production is 60,000 bbl/d. Another development is the £350-million expansion Area B to Texaco's Captain field completed in December 2000 allows production to increase by 25,000 bbl/d to 85,000 bbl/d and will extend the field's life to beyond 2015.

Some of the smaller projects planned for the British North Sea include development of the Jade and Blake fields. In January 2000, the British subsidiary of Phillips Petroleum (operator) and its partners British Gas, Texaco, Agip, and OMV received approval from DTI to develop the Jade field. The field is expected to produce 15,000 bbl/d of crude oil and 200 million cubic feet per day (Mmcf/d) of natural gas after it comes onstream in late 2001. The BG-operated Blake field represents the opening up of the Outer Moray Firth for new discoveries and developments. It has a subsea tie-back to the existing Bleo Holm FPSO, and will extend the life of the existing Ross field. Production is expected to start in third-quarter 2001.

Another important development is the Skene field, which is being developed by operator ExxonMobil as a subsea tie-back to the Beryl Alpha platform. This field has a complex mix of hydrocarbons, including crude oil and condensate, that is estimated to be about 100 million barrels of oil equivalent. Only the implementation of the latest technology using a heated flowline bundle has made recovery possible. It is expected to come online in April 2002.

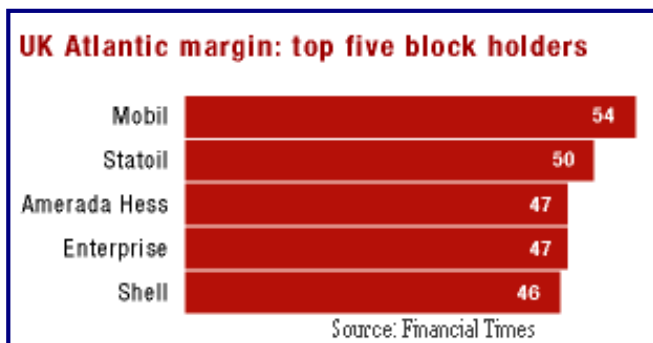
A larger project that was given approval in 2000 is the development of the Leadon field. It was discovered in 1979, but became economically viable with the discovery of a northern extension of the field. The Canadian company Kerr-McGee-operated field is expected to commence production in early 2002, and will peak at 40,000 bbl/d of crude oil.

Europe's largest on-shore oilfield is Wytch Farm. Estimated reserves are 500 million barrels. Egdon Exploration is active in the area, and it is hoped that even smaller fields can be economically viable as they are on-shore. Other smaller on-shore fields are clustered in east-central England.

### **Industry Structure**

Industry reorganization that started with BP's 1998 merger with Amoco continues. The merged BP Amoco, (now simply BP) already one of the world's largest petroleum companies, announced in April 1999 its intentions to take over Los Angeles-based Atlantic Richfield (Arco), which was completed in April 2000. The merged company is truly global and is the world's third-largest publicly traded oil and gas company. Most of the majors have a share of UK North Sea production, including BP, Chevron, Conoco, ENI, ExxonMobil, Royal Dutch/Shell, Texaco, and TotalFinaElf. Amerada Hess, Enterprise, and Statoil also have large shares. The graphic shows the number of blocks held by each top-ranking company in 2000.





BP Exploration is managed from Aberdeen, Scotland (as are most other companies that are active in the British North Sea). BP produces oil and gas and brings ashore 40% of the UK's total production through the Forties Pipeline System to Grangemouth, Scotland. BP Amoco has producing fields in the North Sea and, since the end of 1997, in the North Atlantic, west of the Shetland

Islands. It operates the Sullom Voe oil terminal in the Shetlands, which is Europe's largest oil terminal. The 206,000-bbl/d oil refinery and petrochemical complex at Grangemouth represents one of Scotland's largest industrial complexes.

British independent oil companies, important in the North Sea oil scene, were particularly hard hit by the oil price collapse of 1998. As a result, the major five independents at the time, Enterprise, Lasmo, Premier, British-Borneo, and Cairn, were hesitant to approve new investment and development in 1999-2000, though Enterprise has now begun more investment and development. The consolidation sweeping the oil majors has affected the independents. Enterprise, the largest British independent, unsuccessfully attempted to take over the second largest, Lasmo, in the spring of 1999. Enterprise's UK production was 164,907 barrels of oil equivalent per day in 2000. In 2000, Italian oil and gas giant ENI began to acquire British independents, British-Borneo in March 2000, and Lasmo in February 2001. This gives ENI a presence in the North Sea, and increases its worldwide oil and gas assets, particularly in Asia. Regarding the remaining two independents, Premier is heavily focused outside of the UK, and Cairn's production and reserves are very small, even for an independent.

### **Downstream**

The UK's crude oil refining capacity is approximately 1.77 million barrels per day, just slightly more than the country's consumption. However, the UK imports and exports refined products because British refineries produce an excess of some grades and products and insufficient quantities of others for local demand. Additionally, demand for gasoline varies seasonally. The largest refinery is ExxonMobil's (Esso's) 311,240-bbl/d Fawley refinery in Southampton, one of the largest in Europe and marine tanker accessible. It also has a pipeline to the on-shore Wytch Farm field. The 100,000-bbl/d Port Clarence Phillips-Imperial Petroleum refinery at North Tees is connected by pipeline to the Phillips Consortium Ekofisk Oil Terminal at Seal Sands, giving it a direct feed from the North Sea. The Grangemouth refinery is also directly connected to the North Sea through the Forties Pipeline System.

Petroleum products represented 45% of final energy consumption in 2000. The retail gasoline market is dominated by Esso (ExxonMobil), BP, Shell, TotalFinaElf, Texaco, and Conoco, which together account for 58% of gasoline sales. Supermarkets now account for 8% of retail sales. Total retail sales were 28 billion liters (7.4 billion gallons) in 2000. The transport sector consumed 74% of petroleum products in 2000, whereas the energy industry consumed just 7%. Fuel oil use has declined 30% since 1998, as industrial and home-heating demand has dropped in favor of gas.

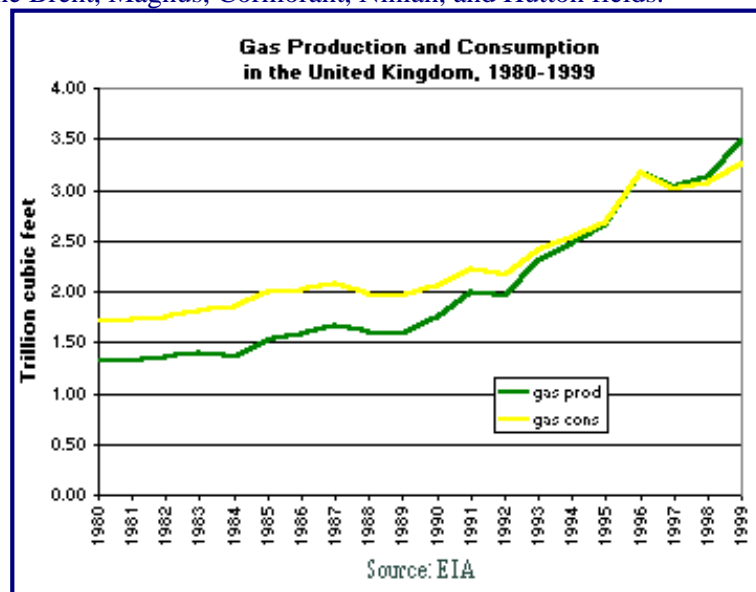
### **NATURAL GAS**

The UK contains an estimated 26.8 trillion cubic feet (Tcf) of natural gas reserves, most of which are in non-associated gas fields located off the English coast in the Southern Gas Basin, adjacent to the Dutch North Sea sector. The UK shares the declining Frigg field with Norway (39.18% to the UK), which is expected to be shut down in 2002, and has small share of the 0.44-Tcf Statfjord field (14.53%). There are a few small fields on-shore. The Irish Sea contains the large Morecambe and Hamilton fields. Morecambe alone accounts for up to 20% of British natural gas production. Key producing gas fields in the North Sea include BP's 5.7-Tcf Leman, Chevron and Conoco's 3-Tcf Britannia, Shell's 1.7-Tcf Indefatigable and 0.8-Tcf Clipper, and TotalFinaElf's 0.85 Tcf Elgin. Key pipelines are the Scottish Area Gas Evacuation (SAGE) system to the St Fergus Terminal, which

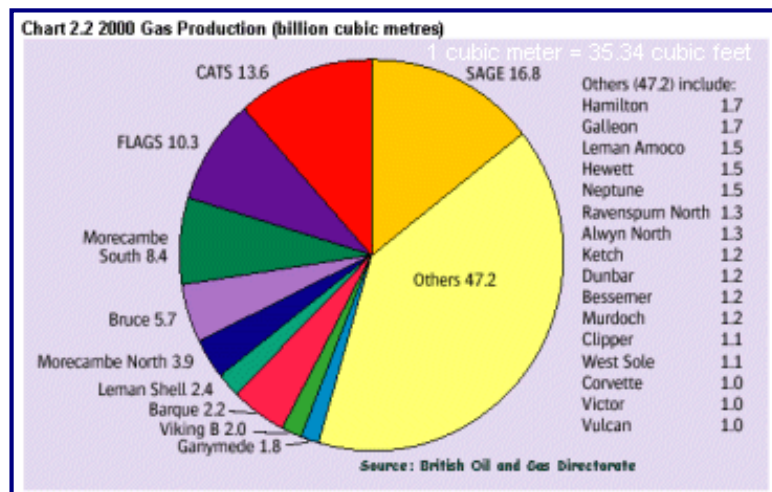
handles gas produced from a number of North Sea fields, including Britannia, the Beryl and Brae areas, and others in the central/northern North Sea, the Central Area Transmission System (CATS) that also goes to the Central North Sea, and takes gas from several fields, including Everest, Judy, and Jade, and others, and the Far North Liquids and Associated Gas System (FLAGS) that takes gas from the northern North Sea, including the Brent, Magnus, Cormorant, Ninian, and Hutton fields.

The largest project to come online in 2001 (in March) in the British North Sea is the TotalFinaElf-operated Elgin/Franklin platform, which might prove to be the last big North Sea production platform. It is the world's largest high-pressure, high temperature development. The Elgin/Franklin platform has extensive processing facilities, unlike most North Sea platforms. The \$2.3-billion platform is expected to last for 22 years in its location in the central North Sea, in the Graben area, off the coast of Scotland. It is to

produce 700 million barrels of oil equivalent, about half condensate and half natural gas. This equates to peak production of 350 million cubic feet per day (Mmcf/d) of natural gas. The export pipelines are shared with the Shearwater field, and include a 294-mile gas pipeline to Bacton and a 24-mile condensate pipeline to the Marnock platform. The Shell-operated Shearwater field in the central North Sea was inaugurated in September 2000, and has reserves of 0.71 Tcf natural gas and 110 million barrels of condensate. Gas production is expected to peak at 375 Mmcf/d.



The Brigantine cluster is the most important recent development in the Southern Gas Basin. It is three fields with two platforms using extended reach horizontal wells to get at reserves of 0.27 Tcf. Shell is the operator, and production of 130 Mmcf/d commenced in the first quarter of 2001. There is a 12-mile pipeline to the Corvette platform, which is connected indirectly with Bacton.



British Gas was the monopoly supplier to the interruptible market until the passage of the 1995 Gas Act, which split the company into supply and shipping (British Gas Trading Limited) and while other functions remained with British Gas, including transport subsidiary Transco. In 1997, Centrica was demerged from British Gas, and British Gas was renamed BG. Centrica is the holding company for British Gas Trading, British Gas Services, the Retail Energy Centers, and is the producer in the Morecambe fields. BG retained Transco, along with exploration and production, international downstream, R&D and properties. In October 2000, BG again split, with Transco becoming part of a separate holding company Lattice Group. Independent Gas suppliers entered the firm (non-tariff) market in 1990, but the larger interruptible market (smaller customers) brought in competition in 1995. The consumer gas market was deregulated by region from October 1997 to June 1998, such that all residential and commercial customers could choose their supplier at the end of this process. At the end of 2000, suppliers other than British Gas Trading had captured 20-30% of the market in many

regions of the UK. In July 2001, Houston-based Dynegy purchased BG Storage from what remains of BG for \$590 million, acquiring gas production wells and platforms, salt caverns, pipelines, and a natural gas processing terminal.

The UK's gas and electricity regulatory body is the Office of Gas and Electricity Markets (Ofgem). Ofgem has proposed reforming price controls on Transco's pipeline usage fees. The privatization of the UK's gas industry, leading to an increased gas supply and reduced prices, has helped gas to replace much of the UK's reliance on coal as a source for electricity generation. The natural gas share of utility fuels was 1% in 1988 and is expected to increase to almost 50% by 2010. Privatization in the UK has progressed well in advance of EU requirements.

In 1998, the UK-Continent Gas Interconnector pipeline was opened, with terminals at Bacton, England and Zeebrugge, Belgium. This is the first natural gas pipeline linking the United Kingdom to the European continent. A new pipeline to connect Ireland to Scottish gas sources in the Corrib field was approved in November 1999, and a plan to connect Ireland to England via Wales was announced in April 2000. A pipeline would run from Manchester, England, underground to Wales, and then under the Irish Sea to just north of Dublin. There is currently one pipeline linking Britain and Ireland, connecting Ireland to Scottish gas sources. Despite these pipeline projects, the UK will remain a much smaller natural gas exporter than North Sea neighbor Norway, and will eventually become a net importer as the UK begins to import Norwegian gas again. Norway had once supplied up to a quarter of British demand in the 1980s, but this dwindled as the Frigg field that supplied the gas was depleted. The new Vesterled gas pipeline, set to begin operations October 1, 2001, will be one of the ways Norwegian gas may enter the UK. Vesterled will connect the existing Frigg pipeline with the Heimdale platform, which is already connected by pipeline to the Sleipner gasfields, and from there to other areas of the Norwegian North Sea such as the Ormen Lange gasfield that is scheduled to come on stream in 2006. In July 2001, BP announced a 15-year contract to buy 56.5 billion cubic feet (Bcf) natural gas per year from Statoil. However, Statoil has indicated that it would not import large volumes of gas through Vesterled unless Britain changed its pricing system for bringing gas onshore from North Sea fields. Statoil officials have asserted that the UK's system of auctioning entry capacity, or access rights to the national pipeline system, had produced volatile, very high prices.

## **COAL**

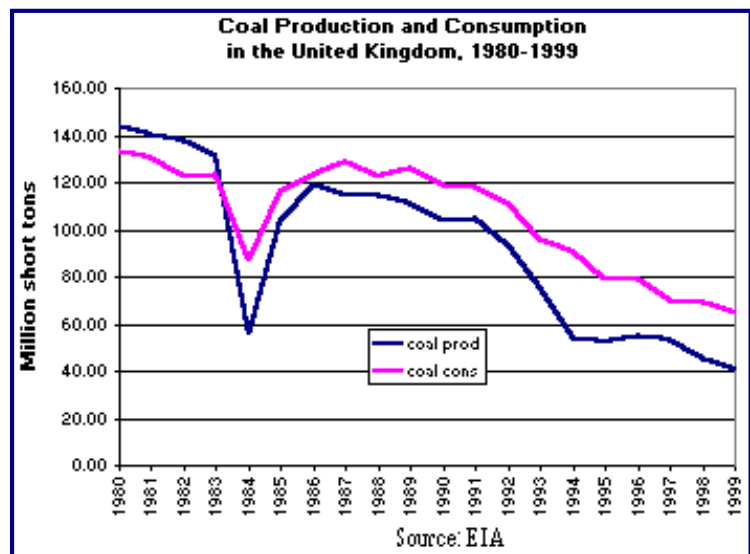
Coal production and consumption in the United Kingdom have decreased dramatically since 1986. UK coal production fell from 119 million short tons (Mmst) in 1986 to 40.9 Mmst in 1999. Production fell again in 2000, but demand rose, increasing imports. In 2000, steam coal accounted for 80% of coal demand, coking coal for 15%, and anthracite for 5%. Electricity demand accounted for 95% of demand for steam coal and 46.5% of demand for anthracite. In the late 1980s, coal accounted for about two-thirds of the United Kingdom's thermal electricity production. Currently, less than half of UK thermal electricity is coal-fired, and the figure is expected to fall below one-third by the end of the decade. Coal mines are located primarily in central and northern England and southern Wales, with some coal mines also found in southern Scotland. The UK produced 40.5 million tons of bituminous coal and 409 thousand tons of anthracite coal in 1999. The UK also produces coke-oven coke in quantities such that it is self-sufficient. Nevertheless, net imports of coal in 1999 were 23.9 million tons.

Between 1984 and 1985, the British coal miners' union staged a year-long strike. The strike dramatically altered energy production and consumption patterns in the United Kingdom for that year and precipitated the longer term decline of the industry (see graph).

Employment in the industry has plummeted since the late 1980s.

The United Kingdom began liberalizing its electricity market in 1989, and this liberalization is one of the major reasons for the decline of the country's coal industry. Prior to the privatization of electricity,

the cost of domestic coal to electric utilities had far exceeded the cost of coal traded in international markets. The Central Electricity Generation Board (CEGB) had been the primary purchaser of British coal. The CEGB largely subsidized the British coal industry, purchasing domestic coal at above world market prices and then passing on those costs to consumers. This ended when National Power and PowerGen, two private electricity generation companies, were formed in the early 1990s, weakening the bargaining power of British Coal, the national coal company.



In 1992, the British coal industry reached a turning point. Growing competition from increasingly available natural gas, the imminent removal of the regional electricity companies' captive franchise supply markets, and newly-enacted pollution abatement goals all worked to initiate the steady decline of the industry. The industry was privatized in 1994, at which point RJB Mining bought the major British Coal assets and became the country's major producer. Mining Scotland and Celtic Energy are the other two remaining companies. The UK coal industry had not received any subsidies since 1995, but in November 2000 the European Commission approved a modernization plan and aid scheme. The aid would go toward mines/production units that have long-term economic viability on the world market, but are having temporary difficulties as they restructure in an effort to reduce production costs. The total amount of aid will not exceed £110 million, and two disbursements of £25 million and £21 million have been made so far. Production costs over the period 1992 to 1999 already fell 35%, and the expectation is that these costs can fall further still before the aid scheme expires in July 2002.

New EU environmental directives are expected to further increase British coal production costs, leading some analysts to predict an end to the United Kingdom's coal industry in the early 2000s. RJB Mining is more optimistic about the future of British coal. RJB maintains that foreign coal prices will increase, making British coal more competitive, and that clean coal technology will allow power stations to burn increased amounts of coal without increased greenhouse gas emissions. Higher natural gas prices, gas-fired power plant outages for maintenance and repair, and reduced nuclear power led to a 14% increase in coal consumption by power producers in 2000.

### **ELECTRICITY**

The United Kingdom has 70 million kilowatts of installed electric capacity, about 80% of which is thermal, 18% nuclear, and 2% hydropower. The country generated 342.8 billion kilowatt hours (bkwh) of electricity in 1999, making it the third-largest electricity market in Europe (behind Germany and France).

Electricity privatization began in the early 1990s, and the final phase of transition ended in May 1999. Initially, all non-nuclear state-owned power stations were privatized and four major generating companies -- PowerGen and National Power in England and Wales, and ScottishPower and Hydro-Electric in Scotland -- were formed to operate the stations. The grid distribution system in England and Wales became the property of the National Grid Company. Regional Electricity Boards were



privatized as separate distribution companies. Large customers were the first to be able to choose their suppliers, with all small customers (below 100 kW peak load) being able to choose by May 1999.

The number of electric generation companies in the United Kingdom has increased to 27 as a result of the liberalization process, according to DTI, such that 40% of the UK's electricity was generated by these new companies in 2000. In March 2001, the structure of the electricity industry changed yet again. Under the former system, generators and suppliers in England and Wales traded electricity through the electricity pool, which was regulated by the National Grid Company, owner of the transmission network. The New Electricity Trading Arrangements (NETA) changed this to a system based on bilateral trading between generators, suppliers, traders, and customers. The system includes forwards and futures markets, a balancing mechanism to enable the National Grid Company to balance the system, and a settlement process. Dallas-based TXU purchased United Utilities' retail electricity and natural gas business, Norweb Energi, for \$465 million in August 2000. This, added to TXU's European retail business Eastern Energy, creates the UK's largest electricity retailer, with over 5.6 million customers. Powergen, with 2.6 million retail customers as well as 14% of electricity generation in England and Wales, merged with Louisville-based LG&E Energy in December 2000.

In Scotland, the two main companies, Scottish Power and Scottish and Southern Energy, cover the full range of electricity provision. Ofgem has made proposals to further reform the Scottish power market. Northern Ireland, part of the United Kingdom but not part of Great Britain, is served by Northern Ireland Electricity, one of the largest companies in Northern Ireland and part of the Viridian Group. Northern Ireland has a separate electricity and gas regulatory body, Ofreg. The grids of Northern Ireland and the Republic of Ireland are connected for electricity import/export.

### **Nuclear**

In 1995, the government announced that it would privatize its more modern nuclear stations while retaining ownership of older stations. In 1996, more modern stations were privatized and British Energy became the holding company of Nuclear Electric and Scottish Nuclear, which merged in 1998 to form British Energy Generation, the nation's largest private nuclear generator and the world's first wholly privatized nuclear utility. British Energy operates eight nuclear power stations in the UK (as well as several in the U.S. through its AmerGen subsidiary that is jointly owned with PECO). Each station consists of two advanced gas-cooled reactors, except Sizewell B, which is a modern pressurized-water reactor. Nuclear power stations were not privatized simultaneously with non-nuclear stations. No new plants have been built since 1995, but because of limited domestic coal and gas reserves in the long run, new construction is under discussion, at least to maintain nuclear's market share as older nuclear plants are retired. Of the UK's 33 reactors, 26 are of the old Magnox design. Six of the Magnox reactors are being decommissioned, as well as the Dounreay prototype fast reactor. The remaining Magnox plants are run by the state-owned British Nuclear Fuels. British Nuclear Fuels operates the Sellafield reprocessing plant, and is one of only two companies in the world that provides reprocessing and recycling technologies. The British nuclear industry is regulated by the Department of Trade and Industry's Nuclear Directorate.

### **ENVIRONMENT**

With a reduction in sulfur dioxide and carbon dioxide emissions, environmental conditions in the United Kingdom have improved over the past couple of decades. Some of these environmental improvements, such as a reduction in [air pollution](#), can be attributed to the United Kingdom's [energy use](#) choices. Partially as a result of deregulation and the elimination of coal subsidies, coal's share of total primary energy consumption is gradually being replaced by natural gas.

Improvements in energy efficiency have led to a gradual reduction in both [energy and carbon intensity](#). In 1980, energy intensity in the United Kingdom registered 11.70 thousand Btu per \$1990, decreasing to 8.37 thousand Btu per \$1990 in 1999, a 27% decline. Similarly, carbon intensity in 1999 registered 0.13 metric tons of carbon per thousand \$1990, a 45% decrease from 1980 levels. [Per capita](#) energy consumption, at 167.8 million Btu in 1999, is rising gradually.



As the United Kingdom enters the [21st century](#), many energy and environment-related policies reflect the country's awareness of climate change issues. With introduction of the Climate Change Levy in 2001, and its exemption for [renewable](#) energy resources like solar and wind, these alternative sources of energy are beginning to gain more attention. For example, the United Kingdom hopes to increase the share of electricity generated by renewables from the current 2%, to 10% by 2010.

*Sources for this report include: Aberdeen Press & Journal; CIA World Factbook; Economist; Economist Intelligence Unit ViewsWire; Financial Times; Hart's European Offshore Petroleum Newsletter; Oil & Gas Journal; Petroleum Economist; Petroleum Intelligence Weekly; The Scotsman; U.K. Department of Trade and Industry; U.S. Energy Information Administration; WEFA World Economic Outlook.*

## **COUNTRY OVERVIEW**

**Head of State:** Queen Elizabeth II

**Prime Minister:** Anthony (Tony) Blair, re-elected June 2001

**Population (2000E):** 59.5 million

**Location/Size:** Western Europe, islands including the northern one-sixth of the island of Ireland between the North Atlantic Ocean and the North Sea, northwest of France/244,820 sq km (slightly smaller than Oregon)

**Capital City:** London

**Language:** English

**Ethnic groups:** English 81.5%, Scottish 9.6%, Irish 2.4%, Welsh 1.9%, Ulster 1.8%, West Indian, Indian, Pakistani, and other 2.8%

**Religions:** Anglican 27 million, Roman Catholic 9 million, Muslim 1 million, Presbyterian 800,000, Methodist 760,000, Sikh 400,000, Hindu 350,000, Jewish 300,000 (1991 est.)

**Defense (8/98):** Army, 113,900; Navy, 44,500; Air Force, 52,540

## **ECONOMIC OVERVIEW**

**Chancellor of the Exchequer:** Gordon Brown

**Currency:** Pound sterling

**Exchange Rate (9/04/01):** 1 US Dollar = 0.69 pounds

**Gross Domestic Product (GDP, 2000E):** \$1,415 billion

**Real GDP Growth Rate (2000E):** 3.0% **(2001F):** 2.0%

**Inflation Rate (consumer prices, 2000E):** 2.9% **(2001F):** 2.0%

**Unemployment Rate (2000E):** 3.7% **(2001F):** 3.4%

**Merchandise Exports (2000E):** \$283 billion

**Merchandise Imports (1999E):** \$327 billion

**Major Trading Partners:** United States, Germany, France, Netherlands

**Major Exports:** Food, beverages, and tobacco; crude materials, fuels, chemicals, machinery, transport equipment

**Major Imports:** Food, beverages, and tobacco; crude materials, fuels, chemicals, machinery, transport equipment

## **ENERGY PROFILE**

**Secretary of State for Trade and Industry:** Patricia Hewitt

**Minister of State for Industry and Energy:** Brian Wilson

**Proven Oil Reserves (1/1/01):** 5 billion barrels

**Oil Production (2000):** 2.75 million bbl/d, of which 2.48 million bbl/d was crude oil

**Oil Consumption (2000):** 1.7 million bbl/d

**Crude Oil Refining Capacity (1/1/01):** 1.77 million bbl/d

**Net Oil Exports (2000):** 1.05 million bbl/d

**Natural Gas Reserves (1/1/01):** 26.8 trillion cubic feet (Tcf)

**Natural Gas Production (1999E):** 3.49 Tcf

**Natural Gas Consumption (1999E):** 3.26 Tcf

**Natural Gas Net Exports (1999E):** 0.02 Tcf

**Major Systems:** Brent, Ninian, Forties, Flotta, Fulmar

**Major Fields:** E. Brae, Brent, Forties, Magnus, Miller, Scott

**Oil and Gas Companies:** Amerada Hess, BP Amoco, BHP, Chevron, ExxonMobil, Kerr-McGee, Phillips, Ranger Oil, Shell, Texaco

**Recoverable Coal Reserves (12/31/96E):** 1.65 billion short tons

**Coal Production (1999E):** 40.9 million short tons (Mmst)

**Coal Consumption (1999E):** 64.8 Mmst

**Electrical Generation Capacity (1/1/99):** 69.9 gigawatts (79.7% thermal, 2.1% hydro, 18% nuclear, 0.2% other)

**Electricity Generation (1999E):** 342.8 billion kilowatt hours (bkwh)

**Electricity Consumption (1999E):** 333 bkwh

## **ENVIRONMENTAL OVERVIEW**

**Secretary of State for the Environment, Food, and Rural Affairs:** Margaret Beckett

**Total Energy Consumption (1999E):** 9.9 quadrillion Btu\* (2.6% of world total energy consumption)

**Energy-Related Carbon Emissions (1999E):** 152.4 million metric tons of carbon (2.5% of world carbon emissions)

**Per Capita Energy Consumption (1999E):** 167.8 million Btu (vs. U.S. value of 355.8 million Btu)

**Per Capita Carbon Emissions (1999E):** 2.6 metric tons of carbon (vs. U.S. value of 5.5 metric tons of carbon)

**Energy Intensity (1999E):** 8,365 Btu/\$1990 (vs U.S. value of 12,638 Btu/\$1990)\*\*

**Carbon Intensity (1999E):** 0.13 metric tons of carbon/thousand \$1990 (vs U.S. value of 0.19 metric tons/thousand \$1990)\*\*

**Sectoral Share of Energy Consumption (1998E):** Industrial (37.0%), Residential (25.4%), Transportation (26.1%), Commercial (11.5%)

**Sectoral Share of Carbon Emissions (1998E):** Industrial (33.7%), Transportation (31.3%), Residential (24.3%), Commercial (10.6%),

**Fuel Share of Energy Consumption (1999E):** Oil (35.0%), Natural Gas (34.9%), Coal (15.7%)

**Fuel Share of Carbon Emissions (1999E):** Oil (41.2%), Natural Gas (33.4%), Coal (25.5%)

**Renewable Energy Consumption (1998E):** 137 trillion Btu\* (15% increase from 1997)

**Number of People per Motor Vehicle (1998):** 2.3 (vs. U.S. value of 1.3)

**Status in Climate Change Negotiations:** Annex I country under the United Nations Framework Convention on Climate Change. Under the negotiated Kyoto Protocol (signed on April 29th, 1998 - not yet ratified), the UK has agreed to reduce greenhouse gases 8% below 1990 levels by the 2008-2012 commitment period.

**Major Environmental Issues:** Sulfur dioxide emissions from power plants contribute to air pollution; some rivers polluted by agricultural wastes and coastal waters polluted because of large-scale disposal of sewage at sea.

**Major International Environmental Agreements:** A party to Conventions on Air Pollution, Air Pollution-Nitrogen Oxides, Air Pollution-Sulphur 94, Air Pollution-Volatile Organic Compounds, Antarctic-Environmental Protocol, Antarctic Treaty, Biodiversity, Climate Change, Desertification, Endangered Species, Environmental Modification, Hazardous Wastes, Law of the Sea, Marine Dumping, Marine Life Conservation, Nuclear Test Ban, Ozone Layer Protection, Ship Pollution, Tropical Timber 83, Tropical Timber 94, Wetlands and Whaling.

\* The total energy consumption statistic includes petroleum, dry natural gas, coal, net hydro, nuclear, geothermal, solar, wind, wood and waste electric power. The renewable energy consumption statistic is based on International Energy Agency (IEA) data and includes hydropower, solar, wind, tide, geothermal, solid biomass and animal products, biomass gas and liquids, industrial and municipal wastes. Sectoral shares of energy consumption and carbon emissions are also based on IEA data.

\*\*GDP based on EIA International Energy Annual 1999.

## Links

For more EIA information on the United Kingdom:

[EIA - Country Information on the United Kingdom](#)

[Electricity Restructuring and Privatization in the United Kingdom](#)

Links to other U.S. Government sites:

[CIA World Factbook - United Kingdom](#)

[U.S. State Department Country Commercial Guides: Europe](#)

[U.S. State Department Consular Information Sheet](#)

[U.S. Geological Survey, map of the United Kingdom including oil fields](#)

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[British Petroleum](#)

[Royal Dutch/Shell](#)

[Energy Links for the UK from Online Energy Services](#)

[International Petroleum Exchange](#)

[Grampian Oil and Gas Directory \(an online database of companies operating in Scotland\)](#)

[Scottish Enterprise Energy Group](#)

[RJB Mining](#)

[Electricity Association](#)

[National Power](#)

[PowerGen](#)

[ScottishPower](#)

[National Grid](#)

[Northern Ireland Electricity](#)

[British Energy \(nuclear generator\)](#)

[British Nuclear Fuels](#)

[UK Energy Centre](#)

[Ofgem](#)

[Ofreg](#)

[Department of Trade and Industry](#)

[Department of Environment, Transport and the Regions](#)

[British Embassy in Washington, D.C.](#)

[Scottish Parliament](#)

[International Energy Agency United Kingdom 1998 Review](#)

[Royal Institute of International Affairs, Energy and Environmental Programme](#)

[European Commission Directorate General XVII \(Energy\)](#)

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File last modified: September 5, 2001

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# Libya

*Libya is a major oil exporter, particularly to Europe. With the suspension of U. N. sanctions against Libya following its extradition of two men suspected in the 1988 bombing of Pan Am flight 103 over Lockerbie, Scotland, oil companies are eager to resume and/or expand operations in Libya.*

*Note: Information contained in this report is the best available as of July 2002 and can change.*



## GENERAL BACKGROUND

Oil export revenues, which account for about 95% of Libya's hard currency earnings (and 75% of government receipts), were hurt severely by the dramatic decline in oil prices during 1998, as well as by reduced oil exports and production - in part as a result of U.S. and U.N. sanctions. With higher oil prices since 1999, however, Libyan oil export revenues have increased sharply, to \$11.0 billion in 2001 and \$10.6 billion forecast for 2002, up from only \$6.0 billion in 1998.



As a result of strong oil export revenues, Libya's fiscal situation is now significantly in surplus.

Libya has experienced strong economic growth over the past three years. Real gross domestic product (GDP) grew by around 6.5% in 2000 and 3.1%-4.3% in 2001. For 2002, real GDP growth of 3.6%-4.5% is expected. Despite this strong economic growth, Libya's unemployment rate remains high, and inflation remains under control (note: the Economist Intelligence Unit in April 2002 stated that Libya actually was in the midst of "significant deflation," although Libyan economic statistics are somewhat unreliable). Libya's relatively poor infrastructure (i.e. roads and logistics), unclear legal structure, often-arbitrary government decisionmaking process, a bloated public sector (as much as 60% of government spending goes towards paying public sector employees' salaries), and various structural rigidities all have been impediments to foreign investment and economic growth. There are signs that the country now is moving towards a variety of economic reforms and a reduction in the state's direct role in the economy.

In January 2002, Libya devalued the official exchange rate on its currency, the dinar, by 51% as part of a move towards unification of the country's multi-tier foreign exchange system. The devaluation also aims to increase the competitiveness of Libyan firms and to help attract foreign investment into the country. Besides the official dinar exchange rate, which is used for state transactions (i.e., imports of goods by the government), Libya has a commercial rate and a black market rate. Also in January 2002, Libya cut its customs duty rate by 50% on most imports in part to help offset the effects of its currency devaluation.

On April 5, 1999, more than 10 years after the 1988 bombing of Pan Am flight 103 over Lockerbie, Scotland that killed 270 people, Libya extradited two men suspected in the attack. In response, the United Nations suspended economic and other sanctions against Libya which had been in place since April 1992. US sanctions, including the Iran-Libya Sanctions Act (ILSA) of 1996 (which covers foreign companies that make new investments of \$40

million or more over a 12-month period in Libya's oil or gas sectors) remain in effect. On July 27, 2001, the US Congress voted to extend ILSA for five more years. UN sanctions since 1992 reportedly have cost Libya billions of dollars in lost income, and have made it more difficult for Libya to develop its energy sector. A full lifting of sanctions can occur 90 days after the UN certifies that Libya has met all requirements, including renunciation of support for terrorist acts. On July 9, 1999, the UN Security Council issued a statement saying that while it "welcomed the significant progress" which Libya had made in complying with UN demands, that at the same time Libya would need to do more (i.e., cooperate with court proceedings, pay compensation to families if the suspects are convicted) before sanctions were lifted permanently. In late May 2002, Libya was reported to be offering \$2.7 billion in compensation to families of Pan Am flight 103, with money to be released as UN and US sanctions are lifted. However, a Libyan government spokesman denied the offer, according to the state news agency (JANA).

Libya is hoping to reduce its dependency on oil as the country's sole source of income, and to increase investment in agriculture, tourism, fisheries, mining, and natural gas. Libya's agricultural sector is a top governmental priority. Hopes are that the Great Man Made River (GMR), a five-phase, \$30-billion project to bring water from underground aquifers beneath the Sahara to the Mediterranean coast, will reduce the country's water shortage and its dependence on food imports. Libya also is attempting to position itself as a key economic intermediary between Europe and Africa, has become more involved in the Euro-Mediterranean process, and has pushed for a new African Union. In April 2001, members of the [Arab Maghreb Union](#) (Algeria, Libya, Mauritania, Morocco, and Tunisia) agreed to encourage intra-regional cooperation on trade, customs, banking, and investment issues.

## OIL

Libya's oil industry is run by the state-owned National Oil Corporation (NOC), along with smaller subsidiary companies. As of 2000, NOC had an estimated total oil production capacity of around 810,000 bbl/d, accounting for over half the country's total. Several international oil companies are

engaged in exploration/production agreements with NOC. The leading foreign oil producer in Libya is Italy's Agip-Eni, which has been operating in the country since 1959. Two US oil companies (Exxon and Mobil) withdrew from Libya in 1982, following a US trade embargo begun in 1981. Five other US companies (Amerada Hess, Conoco, Grace Petroleum, Marathon, and Occidental) remained active in Libya until 1986, when President Reagan ordered them all to cease activities there. Conoco, Amarada Hess and Occidental made up the "Oasis Group," which was producing around 850,000 bbl/d in 1986.

In December 1999, US oil company executives from Oasis plus Marathon traveled to Libya, with US government approval, to visit their old oil facilities in the country. The former head of NOC, Abdullah al-Badri, has stated that if US companies return to Libya, they will return to the fields they used to operate in the country. However, in the first part of 2001, Libya contacted the US companies and indicated that, given its desire to develop their fields, Libya was considering transferring them to European companies. In September 2001, Libya stated that the US companies must either make use of their concessions within a year or risk losing them. In March 2002, the US State Department said that it would permit Marathon Oil to hold discussions with Libyan officials while sanctions remain fully in place.

Overall, Libya would like foreign company help to increase the country's oil production capacity from 1.5 million bbl/d at present to 2 million bbl/d over the next five years. This would restore Libya's oil production capacity to the level of the early 1970s. During the 1970s, the country's revolutionary government imposed tough terms on producing companies, leading to a slide in oilfield investments and oil production. In May 2000, Libya invited around 50 foreign oil and gas companies to a meeting to discuss exploration and production sharing agreements. In order to achieve its oil sector goals, Libya will require as much as \$10 billion in foreign investment through 2010. Around \$6 billion of this is to go towards exploration and production, with the rest going towards refining and petrochemicals. In addition, NOC has earmarked \$1.5 billion for oil infrastructure investment. In January 2002,

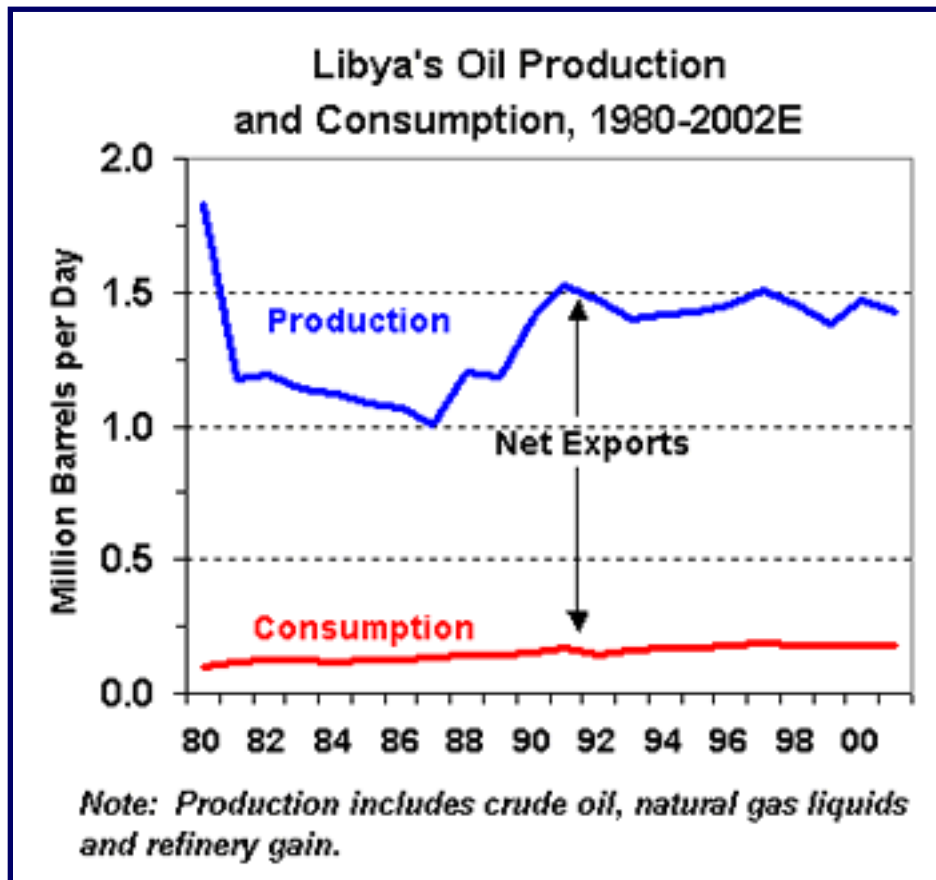
NOC appointed Abdel-Hafez Zleitni as its new chairman, with the specific mission to work on attracting foreign investment into the country's oil sector.

Currently, Libya has 12 oil fields with reserves of 1 billion barrels or more each, and two others with reserves of 500 million-1 billion barrels. Libya's onshore oil (where most production currently takes place) is found mainly in three geological trends of the Sirte Basin: 1) the western fairway, which includes several large oil fields (Samah, Beida, Raguba, Dahra-Hofra, and Bahi); 2) the north-center of the country, which contains the giant Defa-Waha and Nasser fields, as well as the large Hateiba gas field; and 3) an easterly trend, which has such giant fields as Sarir, Messla, Gialo, Bu Attifel, Intisar, Nafoora-Augila, and Amal. Despite years of oil production, Libya retains a large untapped oil and gas potential, with only around 25% of Libya's area covered by agreements with oil companies. This potential is due largely to lack of investment mainly as a result of stringent fiscal terms imposed by Libya on foreign oil companies. NOC priorities for exploration include new areas in the Sirte (i.e., Blocks 25 and 36), Ghadames (i.e., Block 20), and Murzuq basins, plus unexplored areas such as Kufra and Cyrenaica. NOC also hopes to apply modern Enhanced Oil Recovery (EOR) techniques to existing oil fields.

Libya has a relatively narrow continental shelf and slope in the Mediterranean and Gulf of Sirte, which widens in the west in the Gulf of Gabes. The northern part of the Gulf of Gabes, also known as the November Seventh concession, lies on the Libyan-Tunisian border and is rich in oil and gas. As part of a 1988 settlement to a long-standing territorial dispute, the area (which contains an estimated 3.7 billion barrels of oil and nearly 12 trillion cubic feet -- Tcf -- of natural gas) is set to be exploited by the Libyan-Tunisian Joint Oil Company (JOC), a 50-50 venture of Libya's NOC and Tunisia's ETAP. The Libyan side of the zone contains the Omar structure, which is estimated to contain more than 65% of the zone's total oil and gas reserves. On February 1, 1997, JOC awarded the entire block to a consortium consisting of Saudi Arabia's Nimr Petroleum (55%) and Malaysia's Petronas (45%). The companies have a \$30-million, 5-year commitment to explore the block. Full



development of the concession could cost more than \$1 billion.



## Production, Exports, and Reserves

Libya produces high-quality, low-sulphur ("sweet") crude oil at very low cost (as low as \$1 per barrel at some fields).

Libyan oil is priced off of Dated Brent, and main export grades include Es Sider (36-37° API), El Sharara (44° API), Zueitina (42° API), Bu Attifel (41° API), Brega (40° API), Sirtica

(40° API), Sarir (38° API), Amna (36° API), and El Bouri (26° API). Most Libyan oil is sold on a term basis, including to the country's Oilinvest marketing network in Europe; to companies like Agip, OMV, Repsol YPF, Tupras, CEPSA, and TotalFinaElf; and small volumes to Asian and South African companies.

During the first quarter of 2002, Libyan oil production was estimated at just over 1.3 million bbl/d, only about two-fifths of the 3.3 million bbl/d produced in 1970. Libya would like to boost oil output, and the suspension of UN sanctions, along with possible changes to Libya's 1955 hydrocarbons legislation, could be helpful in this regard. Sanctions had caused delays in a number of field development and EOR projects, and had deterred foreign capital investment to an extent. Suspension of sanctions means that Libya now can resume purchases of oil industry equipment.



With reserve replacement slipping since the 1970s, Libya's challenge is maintaining production at mature fields (Brega, Sarir, Sirtica, Waha, Zuetina) while at the same time bringing new fields like Murzuq/El Sharara (online in December 1996; reserves of 2 billion barrels; main operator Repsol-YPF, along with Austria's OMV and TotalFinaElf) and Mabruk online. Libya currently exports about 1.2 million bbl/d of oil. Nearly all (about 90%) of this is sold to European countries like Italy (507,000 bbl/d in 2001), Germany (208,000 bbl/d in 2001), France (70,000 bbl/d in 2001), Spain and Greece.

With state-operated oil fields undergoing a 7%-8% natural decline rate, Libya depends heavily on foreign companies and workers. Major foreign companies include Spain's Repsol-YPF (150,000-200,000 bbl/d of output, mainly at the El Sharara field, plus exploration at blocks NC-186, NC-187, and North-A), Italy's Agip (82,000 bbl/d mainly from Bu Attifel, plus exploration on block NC-174 and in the el-Bouri offshore field), Austria's OMV, Germany's Veba (50,000 bbl/d, mainly from its Amal field in Block NC-12), Wintershal, and multinational TotalFinaElf. Production from Block NC-115 of the Murzuq basin, being developed by Repsol-YPF, TotalFinaElf, and OMV (with 75% of output going to Libya's NOC), increased to around 75,000 bbl/d in early 1998, and 160,000 bbl/d as of October 2001. In January 1999, Repsol (now Repsol-YPF) said that it had found an "important" petroleum deposit of light, sweet (low sulfur) oil in the Block. In December 2001, Repsol-YPF (along with OMV, TotalFinaElf and Saga Petroleum) announced that it had discovered a significant new oil deposit in Block NC-186 of Murzuq. Also, in April 2002, the same Repsol-YPF consortium announced its first discovery in in the NC-190 block of Murzuq, in the Hawaz formation.

Libya is actively courting foreign oil companies, and is considered a highly attractive oil province due to its low cost of oil recovery, its proximity to European markets, and its well-developed infrastructure. European companies reportedly are growing frustrated over the slow pace of progress in awarding Libyan oil concessions, including the 130 exploration blocks offered since UN sanctions were lifted in 1999. As of March 2002, only five packages reportedly had been awarded. In April 2002, Libya signed an

agreement with China to offer Chinese companies a wider role in the Libyan oil sector.

Of NOC's subsidiaries, the largest oil producer is the Waha Oil Company (WOC), created in 1986 to take over operations from Oasis Oil Co., a joint venture of NOC, Conoco, Marathon, and Amarada Hess. WOC has been among the companies most adversely affected by the US embargo. This is due to the fact that its oilfields are equipped mainly with old US equipment, for which WOC cannot now acquire needed spare parts. As a result, production at WOC's giant Waha field has fallen sharply despite an emergency maintenance program begun in 1992.

After Waha, the next largest NOC subsidiary is the Arabian Gulf Oil Company (Agoco), with production coming mainly from the Sarir, Nafoora/Augila, and Messla fields.

Two other large NOC subsidiaries are the Zueitina Oil Company (ZOC), which operates the five Intisar fields in Block 103 of the Sirte Basin, and the Sirte Oil Company (SOC), originally created in 1981 to take over Exxon's holdings in Libya. In 1986, SOC took over the assets of Grace Petroleum, one of the five US companies forced by the US government to leave Libya in 1996. SOC operates the Raguba field in the central part of the Sirte Basin. The field is connected by pipeline to the main line between the Nasser field and Marsa el-Brega. Nasser is one of the largest oilfields in Libya, with production of about 50,000 bbl/d of oil, down from 70,000 bbl/d in 1992. Besides Nasser, SOC is in charge of two other gas fields -- Attahaddy and Assumud -- plus the Marsa el-Brega liquefied natural gas (LNG) plant.

Libya's oilfields are connected to Mediterranean terminals by an extensive network of pipelines. Libya's main crude oil pipelines, all owned by NOC, are: Sarir-Marsa el Hariga (Tobruk); Messla-Ras Lanuf; Waha-Es Sider; Hammada El Hamra-Az Zawiya; Amal-Ras Lanuf; Intisar-Zueitina; Nasser (Zelten)-Marsa El Brega. NOC also has six oil terminals and storage facilities (Marsa El Hariga, Zueitina, Marsa el-Brega, Ras Lanuf, Es Sider,

Zawiya), and is considering bids for a \$150 million-\$300 million expansion of the oil terminal and refinery facility at Az Zawiya.

## **Exploration and Development**

Oil exploration in Libya began in 1955, the key national Petroleum Law No. 25 was enacted in April 1955. Libya's first oil fields were discovered in 1959 (at Amal and Zelten -- now known as Nasser), and oil exports began in 1961. After years of little activity due in part to sanctions, Libya now is attempting to attract foreign companies with improved incentives and production terms. Libya has legislation pending which would grant foreign firms better terms, including access to exploration acreage, small field developments, large field incremental production opportunities, and adoption of international competitive bidding practices. Currently, only around 25% of the country's oil fields have been granted to foreign operators (although Libya does plan to open up some 40 blocks in the Sirte basin and other areas to foreign investment). In July 2000, NOC said that it would open up around 70% of its land to exploration, and that it would bundle exploration blocks into three packages, with the first package to include blocks in the oil-rich Murzuq basin.

The major component of Libya's expansion plans is development of the el-Bouri offshore oilfield off Libya's western coast, the largest producing oilfield in the Mediterranean Sea (at around 60,000 bbl/d). Italy's Agip-Eni is the developer of the field, discovered in 1976 at a depth of 8,700 feet and estimated to contain 2 billion barrels in proven recoverable crude oil reserves. The first phase of field development, costing \$2 billion, was completed in 1990, with el-Bouri producing about 150,000 bbl/d in 1995, with a sharp decline thereafter. This decline was due largely to an inability to import EOR equipment under UN sanctions, and possibly could be reversed with an infusion of investment. Besides oil, el-Bouri also contains large amounts (2.5 Tcf) of associated gas.

Since the discovery of the giant, 2-billion barrel el-Bouri field, Agip-Eni has reported a series of oil finds in its various blocks, as have other oil companies

in the country. The most significant of these is in the Murzuq basin, in the Sahara south of Tripoli. El Bouri was purchased by Repsol in 1993 for \$65 million. Repsol-YPF currently is leading a European consortium, which also consists of OMV and TotalFinaElf. Original expectations were that Murzuq/El Sharara's output of light (44° API), sweet (less than 0.6% sulphur content) crude production would reach 200,000 bbl/d by the end of 1998, but various problems, including difficulties with the pipeline to the port of Az Zawiya, delayed achievement of this target. Currently, oil from Murzuq/El Sharara is being processed by the Az Zawiya refinery.

In October 1997, an international consortium led by British company Lasmo (with a 33.3% stake), along with Agip-Eni (33.3%) and a group of five South Korean companies (led by Korea National Oil Corp., replacing Pedco, and including Hyundai), announced that it had discovered large recoverable crude reserves (around 700 million barrels) at the NC-174 Block, 465 miles south of Tripoli, in the remote Murzuq basin. Lasmo has estimated that production from the field, which it has named Elephant, will cost around \$1 per barrel (Repsol-YPF's Murzuq/El Sharara field, with its 30-inch pipeline to the coast, is located only 40 miles to the north). According to Lasmo, appraisal drilling in 1998 has confirmed recoverable reserves of around 560 million barrels. Elephant originally was due to begin production late in 2000 at around 50,000 bbl/d, and to utilize an existing 30-inch pipeline located 42 miles to the north. Production startup now has been delayed, reportedly due to bureaucratic obstacles, at least until the end of 2002. Production at Elephant is expected to reach 150,000 bbl/d within a year or two of startup.

Other foreign companies active in Libya include: Lundin Oil, a Swedish independent, along with its affiliate Red Sea Oil of Canada, has discovered an estimated 84 million barrels of oil at the En Naga North and West fields on block NC-177 in the Sirte basin (in December 1999, Red Sea announced that testing on the block had been suspended); TotalFinaElf, whose Mabruk field is producing around 18,000 bbl/d; and Canadian Occidental, which controls but has not yet developed a potential 200-million-barrel field in Block NC-101 in the Murzuq basin. In June 2001, Petro-Canada agreed to purchase



Lundin's interest in the En Naga block. In November 2001, TotalFinaElf reportedly was negotiating with NOC to increase production at Mabruk, possibly to 30,000 bbl/d.

## **Refining/Marketing**

Libya has three domestic refineries, with a combined nameplate capacity of approximately 343,400 bbl/d, nearly twice the volume of domestic oil consumption (182,000 bbl/d; the rest is exported). Libya's refineries include: 1) the Ras Lanuf export refinery, completed in 1984 and located on the Gulf of Sirte, with a crude oil refining capacity of 220,000 bbl/d; 2) the Az Zawiya refinery, completed in 1974 and located in northwestern Libya, with crude processing capacity of 120,000 bbl/d; and 3) Brega, the oldest refinery in Libya, located near Tobruk with crude capacity of 8,400 bbl/d. In February 2001, bids were submitted by engineering and construction firms on a \$400 million project to upgrade Az Zawiya (including construction of a new 120,000-bbl/d refinery). In May 2002, Libya signed a \$280 million contract with South Korea's LG Petrochemicals to upgrade the refinery. Ras Lanuf also is slated for upgrading, although that project appears to have been delayed. In March 2002, Ras Lanuf was shut down for several days after a fire broke out at an ethylene storage tank on March 19.

In addition to its domestic refineries, Libya also has operations in Europe. Libya is a direct producer and distributor of refined products in Italy, Germany, Switzerland, and (since early 1998) Egypt. In Italy, Tamoil Italia, based in Milan, controls about 5% of the country's retail market for oil products and lubricants, which are distributed through nearly 2,100 Tamoil service stations. Sanctions have constrained Libya's ability to increase the supply of oil products to European markets, however, as Libya's refineries are badly in need of upgrading, especially in order to meet stricter EU environmental standards in place since 1996. In Egypt, Libya is planning to build gasoline stations on the coastal road linking the two countries as well as in other areas of Egypt. The stations are to be run by Libya's foreign oil investment arm Oilinvest, which maintains 300,000 bbl/d of refining capacity in Europe.



Libya's refining sector reportedly was hard hit by UN sanctions, specifically UN Resolution 883 of November 11, 1993, which banned Libya from importing refinery equipment. Libya is seeking a comprehensive upgrade to its entire refining system, with a particular aim of increasing output of gasoline and other light products (i.e. jet fuel). Possible projects include a new 20,000-bbl/d refinery in Sebha (for which Libya is seeking foreign investment), which would process crude from the nearby Murzuq field, and a 200,000-bbl/d export refinery in Misurata.

## NATURAL GAS

Continued expansion of natural gas production remains a high priority for Libya for two main reasons. First, Libya has aimed (with limited success) to use natural gas instead of oil domestically, freeing up more oil for export. Second, Libya has vast natural gas reserves and is looking to increase its gas exports, particularly to Europe. Libya's proven natural gas reserves in 2002 are estimated at 46.4 Tcf, but the country's actual gas reserves are largely unexploited (and unexplored), and thought by Libyan experts to be considerably larger, possibly 50-70 Tcf. Major producing fields include Attahadi, Hatiba, Zelten, Sahl, and Assumud. To expand its gas production, marketing, and distribution, Libya is looking to foreign participation and investment. In recent years large new discoveries have been made in the Ghadames and el-Bouri fields, as well as in the Sirte basin. Libya also produces a small amount of liquefied petroleum gas (LPG), most of which is consumed by domestic refineries.

Libyan natural gas development projects currently underway include as-Sarah and Nahoora, Faregh, Wafa, offshore block NC-41, abu-Attifel, Intisar, and block NC-98. In May 2000, NOC reportedly came out with a framework for gas exploration in the country, under which NOC would have first priority to the foreign company's gas share at an agreed discount. In December 2000, NOC announced that it had discovered a 472-Bcf gas field in the Sirte basin, northwest of Assumud.

Potential exists for a large increase in Libyan gas exports to Europe, although at present the only customer for Libyan gas is Spain's Enagas. A joint venture between Eni and NOC on the Western Libyan Gas Project (WLGP), a \$4.6 billion plan aimed at developing and exporting large volumes of natural gas to Italy, is moving ahead. In June 2002, for instance, Eni affiliate Saipem was awarded a \$500-\$550 million contract to build and install an offshore natural gas platform northwest of Tripoli. In February 2002, \$1 billion worth of engineering, procurement and construction contracts were awarded to a consortium led by Japan's JGC and including France's Sofregaz and Italy's Technimont. The consortium will work on oil and natural gas infrastructure in the Wafa Desert and near Melitah on the Mediterranean coast.

Overall, the WLGP calls for Libya to export 8 billion cubic meters (280 Bcf) per year of natural gas from a processing facility at Melitah to Italy and France over 24 years, beginning in 2004, via a 370-mile underwater pipeline (called "Green Stream") under the Mediterranean to southeastern Sicily and the Italian mainland. To date, Italy's Edison Gas has committed to taking around half (140 Bcf) of this gas, and to use it mainly for power generation in Italy. Besides Edison, Italy's Energia Gas and Gaz de France have each committed to taking around 70 Bcf of Libyan gas. As part of the overall WLGP, Agip-ENI is set to develop huge Libyan gas reserves in offshore Block NC-41 in the Gulf of Gabes, as well as in the Wafa onshore gas (and oil) field on the Algerian border. Feasibility studies have been completed on Wafa and NC-41, and gas is expected to begin flowing by mid-2004. The project also is expected to produce condensates estimated at around 70,000 bbl/d oil equivalent.

Agip-ENI also has promoted linking the reserves of both Egypt and Libya to Italy by pipeline. An agreement in principle to link Egypt and Libya's natural gas grids was reached in June 1997, following a visit to Libya by Egyptian President Hosni Mubarak. In early May 2002, Egypt's Oil Minister said that ground work on a double pipeline to carry Egyptian natural gas to Libya (for power generation, water desalination, and possible export) and another to carry Libyan oil to Alexandria, Egypt for refining and consumption there).

Yet another proposal is to build a nearly 900-mile pipeline from North Africa to southern Europe. Such a pipeline could transport natural gas from Egypt, Libya, Tunisia and Algeria, via Morocco and into Spain (a pipeline between Morocco and Spain already exists). Also, Tunisia and Libya agreed in May 1997 to set up a joint venture which will build a natural gas pipeline from the Mellita area in Libya to the southern Tunisian city and industrial zone of Gabes. In late 1998, Tunisia and Libya signed an agreement for around 70 Bcf of gas per year to be delivered from Libyan gas fields to Cap Bon, Tunisia beginning in 2003.

In 1971, Libya became the second country in the world (after Algeria in 1964) to export liquefied natural gas (LNG). Since then, Libya's LNG exports have generally languished, largely due to technical limitations which do not allow Libya to extract LPG from the LNG, thereby forcing the buyer to do so. Libya's LNG plant, at Marsa El Brega, was built in the late 1960s by Esso and has a capacity of 124 billion cubic feet per year, but due to technical limitations only about one-third of this is available for export, mainly to Enagas of Spain. Work to refurbish and upgrade the El Brega LNG plant in order to deal with the LPG separation problem has been delayed since 1992. If completed, Libyan LNG exports could triple, with likely customers including Spain, Turkey and Italy. On February 1, 2002, Libya joined the Gas Exporting Countries Forum (GECF), formed in 2001 to promote cooperation in the world natural gas industry. Members of the GECF account for around three-fourths of world natural gas reserves and three-fifths of exports.

## **ELECTRIC POWER**

Libya currently has electric power production capacity of about 4.6 gigawatts. Power demand is growing rapidly (around 6% annually), and Libya has plans to more than double installed capacity by 2010 at a cost of over \$3.5 billion. As of July 2002, however, little progress has been made towards achieving this goal, nor does Libya have any plans at present to privatize its power sector.

Most of Libya's existing power stations are oil-fired, though several have been converted to natural gas. Plans to utilize natural gas include the 600-megawatt (MW) Western Mountain Power Project (Italy's Enelpower has been announced as the preferred bidder), an 800-MW power plant in Zuwara on the west coast, a 1,400-MW power plant to be located on the coast between Benghazi and Tripoli (Enelpower is bidding on this plant as well), and the 1,200-MW "Gulf Stream" combined power and desalination complex in Sirte (France's Alstom appears to be the lead bidder). In February 2002, Russia's Tekhnopromexport signed a \$600 million deal with Libya to build a 650-MW power plant.

Libya's state-owned General Electricity Company (GEC) has hinted at the possibility of allowing private investment in the country's power generation and distribution. The country's power sector requires substantial investment, and officials are looking at alternatives to public financing, but despite this, it remains unlikely that Libya will undertake any large-scale power privatization or allow independent power projects (IPPs) anytime soon. Meanwhile, the Export-Import Bank of South Korea reportedly has guaranteed \$99 million of the \$299 million cost of an expansion and upgrading project at the 450-MW Benghazi North power plant. The project would double the plant's capacity and convert it to combined cycle. GEC's biggest current project is to expand Libya's network of power substations, which are concentrated mainly in Benghazi, Sebha, and Tripoli. In other news, Libya, Egypt, and Tunisia have finished linking their power grids.

## **COUNTRY OVERVIEW**

**President (Chief of State):** Mu'ammar Qadhafi (since September 1, 1969)

**Independence:** December 24, 1951 (from Italy)

**Population (2001E):** 5.2 million

**Location/Size:** North Africa/1,775,500 sq km (685,524 sq mi), slightly larger than Alaska

**Major Cities:** Tripoli (capital), Benghazi, Misurata

**Languages:** Arabic; Italian and English widely understood in major cities



**Ethnic Groups:** Arab (97%)

**Religions:** Sunni Muslim (97%)

**Defense (1998E):** Army (35,000), Air Force (22,000), Navy (8,000)

## **ECONOMIC OVERVIEW**

**Secretary of the Gen. People's Committee for Economy and Trade:**

Shukri Muhammad Ghanim

**Currency:**Libyan Dinar (LD)

**Official Exchange Rate (1/1/02):** US\$1=1.30 LD **Parallel Market**

**Exchange Rate (April 2002):** around US\$1=1.57 LD

**Gross Domestic Product (GDP) (2001E; official exchange rate):** \$31.2 billion (2001E: parallel market exchange rate): \$11.6 billion

**Real GDP Growth Rate (2001E):** 3.1%-4.3% (2002E): 3.6%-4.5%

**Inflation Rate (consumer prices, 2001E):** -8.5% (1Q2002E): 5%

**Unemployment Rate (1998E):** around 30%

**Current Account Balance (2001E):** \$2.0 billion

**Main Destinations of Exports (2000E):** Italy (42%), Germany (19%), Spain (13%), France (6%)

**Main Origins of Imports (2000E):** Italy (25%), Germany (10%), Tunisia (8%), UK (7%)

**Merchandise Exports (2001E):** \$7.5 billion (2002E): \$8.0 billion

**Merchandise Imports (2001E):** \$4.5 billion (2002E): \$4.9 billion

**Merchandise Trade Balance (2001E):** \$3.0 billion (2002E): \$3.1 billion

**Major Export Products:** Crude oil, refined petroleum products, natural gas

**Major Import Products:** Manufactured goods, food and primary products

**Total External Debt (non-military) (2001E):** \$4.4 billion

**International Reserves (12/01E):** \$14.8 billion (17 months worth of import cover)

## **ENERGY OVERVIEW**

**Chairman of the National Oil Company:** Abdel-Hafez Zleitni

**Proven Oil Reserves (1/1/02):** 29.5 billion barrels

**OPEC Crude Oil Production Quota (effective 1/1/02) :** 1.162 million bbl/d

**Oil Production Capacity (2Q 2002E):** 1.5 million bbl/d



**Oil Production (2001E):** 1.43 million barrels per day (bbl/d), of which 1.37 million bbl/d was crude oil, and 60,000 bbl/d was natural gas liquids

**Oil Consumption (2001E):** 182,000 bbl/d

**Net Oil Exports (2001E):** 1.25 million bbl/d

**Major Oil Customers (2000E):** Italy, Germany, Spain, and France combined account for around three-quarters of Libya's oil exports; other customers include Austria, Greece, Britain, and Switzerland

**Crude Oil Export Revenues (2000E):** \$12.9 billion **(2001E):** \$12.5 billion

**Oil Export Revenues/Total Export Revenues (2000E):** 98%

**Crude Oil Refining Capacity (1/1/02E):** 343,400 bbl/d

**Natural Gas Reserves (1/1/02):** 46.4 trillion cubic feet (Tcf)

**Natural Gas Production (2000E):** 0.21 Tcf

**Natural Gas Consumption (2000E):** 0.18 Tcf

**Electric Generation Capacity (2000E):** 4.6 gigawatts (all thermal)

**Electricity Generation (2000E):** 19.4 terawatthours

## ENVIRONMENTAL OVERVIEW

**Total Energy Consumption (2000E):** 0.58 quadrillion Btu\* (0.15% of world total energy consumption)

**Energy-Related Carbon Emissions (2000E):** 10.9 million metric tons of carbon (0.2% of world carbon emissions)

**Per Capita Energy Consumption (2000E):** 109.6 million Btu (vs U.S. value of 348.9 million Btu)

**Per Capita Carbon Emissions (2000E):** 2.1 metric tons of carbon (vs U.S. value of 5.7 metric tons of carbon)

**Energy Intensity (2000E):** 18,412 Btu/\$1995 (vs U.S. value of 10,919 Btu/\$1995)\*\*

**Carbon Intensity (2000E):** 0.35 metric tons of carbon/thousand \$1995 (vs U.S. value of 0.17 metric tons/thousand \$1995)\*\*

**Sectoral Share of Energy Consumption (1998E):** Transportation (48.4%), Industrial (45.8%), Residential (5.8%), Commercial (0.0%)

**Sectoral Share of Carbon Emissions (1998E):** Transportation (53.7%), Industrial (40.6%), Residential (5.6%), Commercial (0.0%)

**Fuel Share of Energy Consumption (2000E):** Oil (65.5%), Natural Gas

(34.5%)

**Fuel Share of Carbon Emissions (1999E):** Oil (67.8%), Natural Gas (32.1%)

**Renewable Energy Consumption (1998E):** 66.5 trillion Btu\* (1,278% increase from 1997)

**Number of People per Motor Vehicle (1998):** 4.8 (vs U.S. value of 1.3)

**Status in Climate Change Negotiations:** Non-Annex I country under the United Nations Framework Convention on Climate Change (ratified June 14th, 1999). Not a signatory to the Kyoto Protocol.

**Major Environmental Issues:** Desertification; very limited natural fresh water resources; the Great Manmade River Project, the largest water development scheme in the world, is being built to bring water from large aquifers under the Sahara to coastal cities.

**Major International Environmental Agreements:** A party to Conventions on Desertification, Marine Dumping, Nuclear Test Ban and Ozone Layer Protection. Has signed, but not ratified, Biodiversity, Climate Change and Law of the Sea.

\* The total energy consumption statistic includes petroleum, dry natural gas, coal, net hydro, nuclear, geothermal, solar, wind, wood and waste electric power. The renewable energy consumption statistic is based on International Energy Agency (IEA) data and includes hydropower, solar, wind, tide, geothermal, solid biomass and animal products, biomass gas and liquids, industrial and municipal wastes. Sectoral shares of energy consumption and carbon emissions are also based on IEA data.

\*\*GDP based on EIA International Energy Annual 2000

## OIL AND GAS INDUSTRIES

**State Oil Companies:** *Libyan National Oil Company* (NOC) - Manages the state-owned oil industry and controls over 70% of Libya's oil production, *Oilinvest* - Manages all international investments

**Foreign Energy Company Involvement:** Agip (Italy), Canadian Occidental, Eni (Italy), Husky Oil (Canada), Lasmo (UK), Lundin Oil (Sweden), Nimr Petroleum (Saudi Arabia), OMV (Austria), PanCanadian; Pedco (South

Korea), Petrobras (Brazil), Petro-Canada (Canada), Petronas (Malaysia), Red Sea Oil Corp. (Canada), Repsol-YPF (Spain), Saga (Norway), Shell; TotalFinaElf (France), Veba (Germany), Wintershall (Germany)

**Major Oil Ports:** Es Sider, Zuetina, Tripoli

**Major Oil and Gas Fields:** Amal, el-Bouri, Bu Attifel, Defa-Waha, Elephant, Kabir, Mabruk, Murzuq, Nasser, Omar, Sarah, Zueitina

**Major Pipelines:** Amal-Ras Lanuf; Defa-Nasser; Hammada el Hamra-Az Zawiya; Intisar-Zueitina; Intisar -Hatiba; Messla-Ras Lanuf; Nasser-Hatiba; Nasser (Zelten)-Marsa el Brega; Sarir-Marsa el Hariga; Waha-Es Sider

**Major Refineries (crude oil capacity):** Ras Lanuf (220,000 bbl/d), Az-Zawiya (115,000 bbl/d), Brega (8,400 bbl/d)

*Sources for this report include: Africa News; Africa Oil and Gas; AFX European Focus; Agence France Presse; AP Worldstream; BBC Summary of World Broadcasts; Canada NewsWire; CIA World Factbook 2001; Dow Jones Interactive; Dow Jones Newswires; DRI/WEFA; Economist Intelligence Unit ViewsWire; Energy Day; Financial Times Energy Newsletters; The Guardian; Hart's Africa Oil and Gas; Hart's E & P Daily; Les Echos; Middle East Economic Digest (MEED); Middle East Economic Survey (MEES); Oil Daily; Oil and Gas Journal; Petroleum Economist; Petroleum Intelligence Weekly; Platt's Oilgram News; Reuters; U.S. Energy Information Administration; Washington Post; World Gas Intelligence; World Markets Online; World Oil.*

## LINKS

For more information on Libya, please see these other sources on the EIA web site:

[EIA - Historical Energy Data on Libya](#)

[OPEC Revenues Fact Sheet](#)

Links to other U.S. government sites:

[2001 CIA World Factbook - Libya](#)

[U.S. Treasury Department's Office of Foreign Assets Control](#)

[Iran-Libya Sanctions Act Extension](#)

[U.S. State Department's Consular Information Sheet - Libya](#)

[Library of Congress Country Study on Libya](#)

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*April 2002*

# North Central Europe

*North Central Europe is important to world energy markets because it is a significant producer and exporter of coal and an important transit point for Russian oil and natural gas pipelines*

*Note: Information contained in this report is the best available as of March 2002 and is subject to change.*



## GENERAL BACKGROUND

[Poland](#), the [Czech Republic](#), the [Slovak Republic](#) (commonly referred to as Slovakia), and [Hungary](#) are all the members of the [Visegrad Group](#) and share certain common characteristics in addition to being geographical neighbors. The Czech Republic and Slovakia were the single country of Czechoslovakia formed from the former Austro-Hungarian Empire in 1918 (with an interruption during the Second World War) until Czechoslovakia's peaceful dissolution into the independent states of the Czech Republic and the Slovak Republic in 1993. Hence, the Visegrad group was known as the Visegrad Troika when it was formed February 15, 1991 in Visegrad, Hungary. Hungary, Poland, and Czechoslovakia had all been Communist states and members of the Warsaw Pact during the years following World War II until 1989-1990. All three states had developed heavy industry that was characterized by being very energy intensive and polluting. Poland is much larger than the other states of the Visegrad Group in area and population, having a greater population than the other three combined. Hungary's main ethnic group is not Slavic in origin, unlike the other two (now three) states.

Hungary and Slovakia have large minority populations, with both having large populations of Roma, and Slovakia having a significant Hungarian minority. The issue of ethnic Hungarians living outside Hungary has become an important issue for the current Hungarian government, which passed a law granting economic, cultural, and educational benefits to ethnic Hungarians in neighboring countries. This has caused some friction with Slovakia, which sees the law as having an extraterritorial nature.

All four countries have successfully transitioned to democracy and have made great strides in moving to market-based economies. Slovakia was slower to change than the other three, especially in the area of democracy, and is unlikely to be among the first group of former Communist countries to enter the [European Union \(EU\)](#), although the country has made great strides of late. Poland remains a more rural society than the Czech Republic or Hungary. All four countries have applied for membership in the EU, with Poland, the Czech Republic, and Hungary probably acceding in 2004 or 2005. In 1999, Hungary, Poland, and the Czech Republic became the first former-Warsaw Pact countries to join the [North Atlantic Treaty Organization \(NATO\)](#). Slovakia is a member of NATO's Euro-Atlantic Partnership Council. The Czech Republic became a member of the [Organization for Economic Co-operation and Development](#) in 1995, Hungary and Poland joined in 1996, and Slovakia in 2001. As members of the Visegrad Group, the four countries are

also members of the [Central European Free Trade Agreement \(CEFTA\)](#). There is a customs union between the Czech and Slovak Republics, and most products have no tariffs or quotas for trade amongst the other countries, with the exception of agriculture. CEFTA was founded by the Visegrad Troika, but [Slovenia](#), [Romania](#), and [Bulgaria](#) have since joined.

The Visegrad countries are dependent on trade with the EU and in particular with [Germany](#).

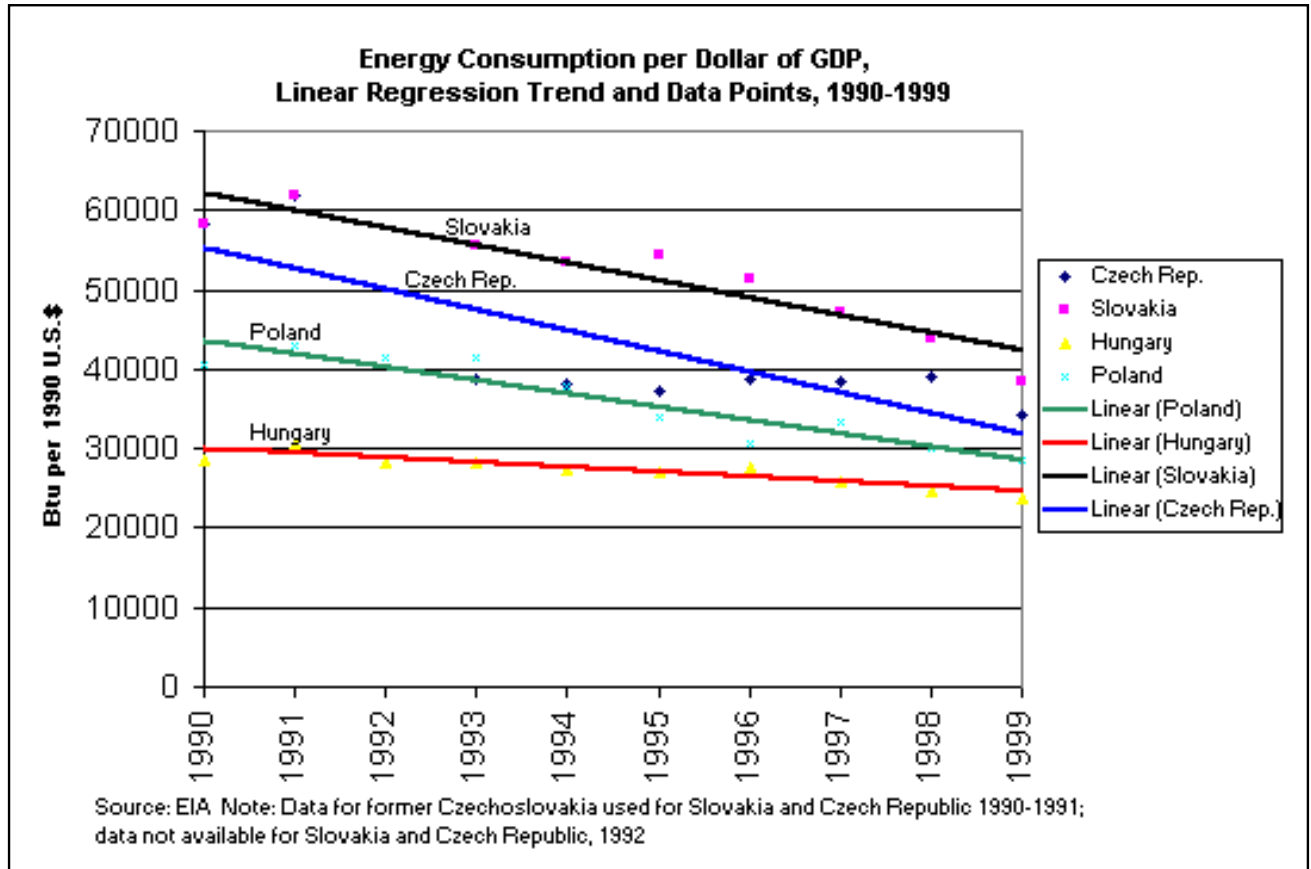
Continuing economic challenges that these countries share include: technologically backward agricultural sectors that will find it difficult to compete internationally; industries that are still more energy intensive than their counterparts

in western Europe (though energy intensity is on a declining trend as these economies become more similar to their western counterparts; see chart); costs from heavily-polluting industries and clean-up costs; the challenge of increasing standards of industries and services to the levels of the EU.

## **REGIONAL ENERGY ISSUES**

Coal is the only fossil fuel of abundance in the region, and only Poland and the Czech Republic have substantial quantities of hard coal. Poland is the largest hard coal producer and exporter in absolute terms by far, though the Czech Republic exports over one-third of its production, whereas Poland only exports about one-fifth of its coal output. Of strategic importance is the fact that most of the crude oil and natural gas from [Russia](#) that is piped to western Europe passes through the Visegrad region, with the four countries only taking a small part of this for domestic consumption. Crude oil consumption in the region is small -- only about 56% of that of [Spain](#) alone. Not only is the region's total natural gas consumption (1.4 trillion cubic feet - Tcf) smaller than its neighbor Germany (over 3 Tcf), but Poland and Hungary each satisfied more than one third of their natural gas consumption from domestic sources in 2000. Preliminary estimates of imports of Russian natural gas into the region during January-November 2001 show Hungary importing 257.8 billion cubic feet (Bcf), the Czech Republic 243.7 Bcf, Poland 240.1 Bcf, and Slovakia about 236 Bcf.

The Czech Republic and Poland export coal to each other, and both countries have import quotas for the other. Unions in Poland have campaigned to have the quota for Czech imports lowered, whereas industries in the Czech Republic have campaigned to have the quota for Polish imports raised. Polish coal has become cheaper than Czech coal in the



Czech Republic, but Polish unions claim that Czech coal is "dumped" in Poland. Neither government has changed its quotas so far.

## Oil Transit

The northern branch of the 1-million-barrel-per-day capacity Druzhba ("Friendship") pipeline from [Russia](#) through [Belarus](#) brings oil to Poland which then can be transited onward to Germany. The 1.2-million-barrel-per-day capacity southern branch of the Druzhba pipeline runs from Russia through [Ukraine](#) into Slovakia. In August 2001, the Yuzhnyy-Brody pipeline was officially opened in Ukraine. This allows [Caspian](#) region oil that is piped to Black Sea ports to be shipped across the Black Sea to Yuzhnyy's Pivdenny terminal (near Odessa) and then transported in a new pipeline to Brody, where it connects with the southern Druzhba pipeline for shipment to Slovakia, Hungary, and onward. There is discussion of extending the Yuzhnyy-Brody pipeline north to Plotz in Poland where the pipeline could tie into the Druzhba northern route and/or an existing line to the Polish Baltic Sea port of Gdansk and allow imports of Caspian crude oil to Poland, Germany, and other Baltic states. The southern Druzhba pipeline splits in Ukraine just before it reaches the borders of Slovakia and Hungary. Some of the oil imported into Hungary transits onward to [the former Yugoslavia](#) and the Croatian port of Omisalj on the Adriatic.

## Natural Gas Transit

The region is extremely important as a transit center for Russian natural gas exports to western Europe. The Yamal pipeline from Russia will deliver about 1.1 Tcf per year into Poland by 2005 under current contracts. Most of this natural gas transits onward to Germany. Yamal is the only route that bypasses [Ukraine](#). The Russians have considered adding additional routes that bypass Ukraine for their natural gas exports to Europe, partially because Russia has accused Ukraine of stealing natural gas transiting through the country and because of Ukraine's nearly \$2 billion in debt to Russia for natural gas. The planned Yamal II pipeline would link Yamal with the Southern pipeline to make for an additional source for the pipelines in Slovakia that currently take natural gas transiting through Ukraine. Yamal II has not been formally approved yet and there are still disagreements about its route in Poland. Germany and Russia appear to favor a route that is more southerly, as that is where Germany has more natural gas demand, but Poland favors a more northerly route that could provide some natural gas to its industries as the pipeline passes through to Germany. A possible entirely new natural gas pipeline from Russia to Slovakia by way of Belarus and Poland appears to have been cancelled by Gazprom in February 2002. This pipeline differed from the planned Yamal II in that it would have had a new source pipeline in Russia, instead of just feeding off of existing Russian pipelines and would only have transited through the region to western Europe; it would not have provided natural gas to the intermediary countries. In March 2002, Poland's state auditor NIK urged the Polish government to renegotiate its long-term supply deal with Russia.

The Brotherhood (Druzhba), Progress, and Soyuz natural gas pipelines that go through Ukraine to Slovakia have annual capacities of about 1 Tcf each. There is still some excess capacity in the pipelines. From Slovakia, the natural gas transits to Austria and the Czech Republic. The natural gas that passes through Slovakia represents about 25% of the natural gas consumed in western Europe and about 70% of the Russian natural gas exported to western Europe. The Druzhba pipeline splits in the Ukraine, with one part going to Hungary. Hungary takes some of the natural gas, and the rest continues on to the Balkans. At a meeting of the Visegrad Group's Economic Forum in September 2001, the possibility of providing Polish natural gas imports from Norway and/or Denmark to Slovakia and/or Hungary was discussed, with favorable statements by leaders. The region's leaders worry about being too dependent on Russia.

## Regional Integration

There have been attempts by various energy companies in the region to merge in order to compete with larger rivals from the west and from Russia. The two largest oil companies in the region, Nafta Polska's PKN Orlen of Poland and MOL of Hungary have been in so-far unsuccessful talks to sell a 17.58% share of PKN Orlen for some time. OMV of



Austria has now been permitted to be involved in these talks by the new Polish government, which have been extended now to April 15, 2002. The result of such a sell-off likely would create a loosely-tied regional oil company. MOL did purchase a 36.2% share of Slovakian oil company Slovnaft in 2001, which is the only integration of the region's oil companies so far, though MOL in particular continues to look for ways to expand in the region.

The region shares the CENTREL electricity system, which links the Czech Republic, Slovakia and Hungary. In 1995, the CENTREL system was connected with Western Europe's system. Poland also has electricity connections with Ukraine and Belarus. Currently, both north-south and east-west connections are being expanded, as part of the EU's [Trans-European Energy Network](#) project, including a new link to Lithuania. The four countries of the region are also members of European electricity transmission system [Union for the Coordination of Transmission of Electricity \(UCTE\)](#). UCTE coordinates the interests of transmission system operators in 20 European countries.

There has been some interest in a regional energy exchange market, but rivalries over where it would be based as well as the regions's eventual integration into the EU that might make such a market superfluous have delayed this idea. Poland and the Czech Republic are developing electricity exchanges, while such exchanges are still in the planning stages in Hungary and Slovakia. Hungary imports a large amount of electricity from Slovakia, and is the region's only net power importer. Much of Poland and the Czech Republic's electricity exports go to western markets, Germany in particular.

## POLAND

Poland was one of the first of the former Soviet satellite countries to hold free elections and to successfully introduce market reforms (1989). A new constitution was approved by a national referendum in May 1997. On September 23, 2001, Poland held legislative elections in which no party won an outright majority. In October 2001, a coalition government was formed by the Democratic Left Alliance (the former Communist Party) that won 41% of the popular vote, but was still 15 seats short of an absolute majority. After joining with the Polish Peasants Party in a coalition, Leszek Miller of the Democratic Left Alliance became prime minister on October 19, 2001. The new coalition has called for a relaxing of monetary policy by Poland's Central Bank in order to promote economic growth and to reduce the country's high (over 16%) unemployment rate. Poland's real GDP growth rate slowed from 4% in 2000 to 1.3% in 2001. It is estimated that Poland's high rate of foreign direct investment (\$10.6 billion in 2000) fell considerably in 2001. The economic downturn has also reduced government revenue, to as little as 49% of the target for January-July 2001. The budget deficit was estimated by the previous government to be about \$7 billion, or 4% of GDP, in July 2001. The current government has taken measures, including a new tax, to ensure that the budget deficit does not exceed \$9.4 billion, especially in light of continuing low economic growth rates. Poland's inflation rate is at a recent historical low.



Poland is planning to enter the EU in the group's next expansion, and the country is in the midst of reforms necessary to meet membership criteria. Coal and steel industry restructuring is expected to be completed by the end of 2001, and the energy sector will be open to competition by about 2004. Many Polish farmers are opposed to joining the EU, as they believe it will entail agricultural reforms that will render them unable to compete with imports. Poland has a current account deficit and is working to make its exports more competitive. On balance, EU membership is expected to benefit Poland, decreasing trade barriers with key trade partners such as Germany and enhancing political stability. In turn, Poland is a key to EU expansion plans, as Poland is by far the largest country, in terms of both population and gross domestic product, among the twelve states that have begun discussion of accession to the EU.

## **Energy**

In April 1997, the Polish government passed a new [Energy Act](#), which required the Government Economic Committee to pass "Guidelines on Poland's Energy Policy Through 2020." The document spells out long-term energy forecasts and action plans for the Polish government. The key objectives include: increased security of energy supplies, (including diversification of sources); increased competitiveness for Polish energy sources in domestic and international markets; [environmental protection](#); improving energy efficiency; and reducing energy-related carbon emissions. Coal is Poland's most important domestic energy source. While coal production is declining and will continue to decline over the coming years, it will remain a key energy source. In 2001, the Supreme Board of Inspection (NIK) released a report stating that energy sector reform is moving too slowly. The report cited insufficient privatization in the oil sector, a halt in natural gas sector restructuring due to a dispute with the regulator, and problems with coal sector reforms. Poland will have to have a 90-day oil reserve by 2008 as part of its EU agreements.

## **Oil**

With proven oil reserves of only 115 million barrels, Poland relied on imports for 97% of its 2001 oil consumption. Poland's oil demand is expected to increase by as much as 50% by 2020. Polish oil production increased from 10,000 barrels per day (bbl/d) in 2000 to 14,000 bbl/d in 2001, but this is still a small fraction of oil demand (434,000 bbl/d). Polish oil production comes primarily from fields in southern and western Poland, with the southern reserves nearly exhausted. However, the Barnówko - Mostno - Buszewo "BMB" field discovered in 1996 in the Polish part of the Permian Basin (near the German border directly east of Berlin) has potential reserves of about 73 million barrels and the Miedzychod field is estimated to have even more, so Poland should be able to increase its production as these fields come on line.

Poland's oil and gas industries were consolidated in 1981 into a single entity, the state-owned Polish Oil and Gas Company (PGNiG), which dominates the natural gas and upstream oil industries. In 1996, PGNiG became a joint-stock company. The company is slated for privatization after restructuring is completed, bringing the country into line with EU regulations. While a specific privatization plan remains forthcoming, major components of the company are expected to become independent from each other, rather than having a single holding company. There could be one upstream company; one company responsible for gas trade, transmission and storage; and four regional gas distribution companies. The upstream company and the four distribution companies would be privatized first, while the transmission and storage company could remain state-owned for longer.

Oil imports from Russia through the Druzhba ("Przyjazn" in Polish) pipeline traditionally have been the main Polish oil source. Following the breakup of the Soviet Bloc, Poland attempted to diversify its oil sources and to reduce its dependence on Russian oil. For this reason, the "Naftoport" oil terminal at Gdansk was constructed in the 1990s, with a capacity to receive about 600,000 bbl/d. However, Russian oil has remained relatively inexpensive, and economic factors have resulted in Poland actually increasing its imports of Russian oil. In addition, Poland imports oil from Russia's Kaliningrad enclave through the Naftoport.



Russian oil is not imported through direct agreements with Russian suppliers. Rather, there is a complex network of middlemen, the most important of which is the J&S Company of Cyprus. In 2000, 60% of the crude oil purchased by PKN Orlen and 70% of the oil purchased by Rafineria Gdansk (RG) was from J&S. It is estimated that J&S supplies between 60% and 70% of all crude oil processed by Polish refineries. To the Russians, these middlemen are referred to as "operators" and because of a host of regulations, important documents, and licenses, the operators do all the paperwork and financial transfers. Some Polish politicians have questioned this system.

Poland and Ukraine reached an agreement in February 1999 to complete jointly an extension of the 500,000-bbl/d [Odesa-Brody pipeline](#) for Caspian Sea oil to go through Ukraine to Poland.

In July 2000, Germany-based EuroGas, Inc. won ten concessions to explore and develop oil and natural gas deposits in southeast Poland. The company believes that the area, the Karpaten Flysch oil province near the city of Sanok, potentially has a 350-million-barrel oil field, or an equivalent quantity of natural gas, which would represent one of the larger oil and gas discoveries in the region. In November 2000, EuroGas signed an agreement with PGNiG to jointly develop the area through EuroGas' subsidiary. As part of the agreement, PGNiG acquired 30% of EuroGas' Polish subsidiary, EuroGas Polska.

## **Downstream**

Most of Poland's refineries, which were built in the 1960s and 1970s, need modernization in order to meet the current shift in demand towards lighter products such as gasoline and diesel fuel. Refinery capacity also will need to expand to meet growing oil demand. PKN Orlen's 260,000-bbl/d Plock refinery has had some improvements done and others are planned in its efforts to eventually conform to EU standards.

The state's oil companies are held through Nafta Polska, a state holding company and privatization vehicle. Nafta Polska's PKN Orlen controls about 60% of the wholesale and about 40% of the retail fuel markets. In September 2001, the sale of 75% of the 90,000-bbl/d Gdansk refinery to Rotch Energy of the United Kingdom was approved. Rotch paid about \$250 million for its stake and agreed to invest \$600-\$700 million in expansion over the next few years to boost the refinery's capacity to about 150,000 bbl/d.

Gasoline and diesel demand has fallen slightly in recent months, due to higher prices and an economic slowdown. However, the demand for heating oil (which is sometimes used as a vehicle fuel) and liquefied petroleum gas (LPG) has risen sharply, and about 530,000 vehicles in Poland are capable of using LPG, with many vehicles being converted every year.

## **Natural Gas**

Poland has an estimated 5.1 trillion cubic feet (Tcf) of natural gas reserves. The country imported over 65% of its 442-billion cubic feet (Bcf) consumption in 1999. Natural gas production remained fairly stable throughout the 1990s, hovering between 150 Bcf and 180 Bcf, and was about 183 Bcf in 2001. This rate of production is expected to continue into the 21st century, as new exploration takes the place of depleting reserves. FX Energy, a U.S.-based company active in Poland with a 49% stake in the Fences gasfield (51% is owned by PGNiG), began production at its Kleska well in March 2001 at an initial rate of 2 million cubic feet per day. PGNiG is planning to launch 200 new drilling sites in 2002 at a cost of Zl 700-800 million and invest Zl 600 million in domestic oil and natural gas exploration. The company also plans to liquidate 1,500 old and exploited drilling sites within the next five years.

The outlook for natural gas imports into Poland is problematic over the next few years. Despite the fact that Poland's real GDP has grown by about 21% since 1997, natural gas demand has remained flat and is predicted to remain so over the next decade. Even optimistic unofficial Polish government forecasts estimate demand in 2005 to be between

484 and 572 Bcf. Much of the reason for this is that natural gas is simply uneconomical for power generation in Poland compared with coal. Yet, at the same time, diversification of natural gas sources is a high priority for Poland, and those traders with diversified sources will have priority. Russia supplied over 60% of all Polish natural gas in 2000, with smaller amounts coming from or through Germany as well as over 30% from domestic sources. Poland and Russia disagree about the route of the proposed extension of the Yamal pipeline (Yamal II). Poland's contracts with Gazprom are for imports to increase to 441 Bcf per year by 2010. However, in January 2002, Polish Economy Minister Jacek Piechota stated that the contract with Russia as well as the specifics of the extension of the Yamal pipeline will have to be renegotiated.

PGNiG recently has reached agreements to import Danish and [Norwegian](#) natural gas. In July 2001, an agreement was signed with Dansk Olie og Naturgas (DONG) of Denmark to import 16 billion cubic meters (565 Bcf) over eight years, starting in 2003. This would be done through the planned \$330-million, 186-mile BalticPipe pipeline, scheduled to be constructed beginning in the summer of 2002. The pipeline's capacity, 283 Bcf per year, is four times the volume that PGNiG will import from DONG annually, prompting some to question whether the pipeline will be financially viable. In September 2001, PGNiG and Norway's (now defunct) Gas Negotiating Committee (GFU) agreed to the delivery of 74 billion cubic meters (2.6 Tcf) over 16 years. This replaces the previous contract with Norway for 500 million cubic meters (18 Bcf) per year until 2006. These deliveries would not start until 2008, and would gradually increase over the first three years. Norwegian exports to Poland would require the construction of the \$1.1-billion, 683-mile Austerled pipeline. Given probable increasing domestic natural gas production and flat demand, it will be very difficult for Poland to maintain its Russian, Danish, and Norwegian contracts in their present state. The new government already has signaled that it will probably amend or even cancel some or all of these contracts.

Poland needs to increase its [environmental standards](#) as part of its application to achieve member status in the EU. Increased consumption of natural gas, as an alternative to coal, is considered to be a key component of Poland's plan to meet the stricter regulations. The Polish government forecasts that about 14% of electricity will be generated from natural gas by 2020, up from just 2% in 2000, but still a relatively small share. Poland also will need to liberalize at least 28% of its natural gas market by August 2003, according to EU directives.

The Yamal pipeline connecting Poland to Siberian natural gas sources, began operations in September 1999. The \$35-billion pipeline was designed to carry natural gas supplies from the Yamal (West Siberia) field in Russia to Germany and other Western European countries through Belarus and Poland. Under a 25-year contract signed in October 1996, annual throughput capacity of the pipeline is slated to increase to 32 billion cubic meters (about 1.1 Tcf) by 2005. The Polish section is operated by EuroPol Gaz and is 48% owned by PGNiG and Gazprom each, with the remaining 4% owned by a consortium of Polish firms called Gas Trading. Russia is seeking to link this new pipeline with the Southern pipeline, which would allow additional Russian gas to reach Western European markets while bypassing Ukraine (Yamal II). The exact route was discussed at senior-level Russo-Polish talks in January 2002, though no decision has been taken. Also in January 2002, Gazprom and PGNiG announced that feasibility tests will begin soon for the second stretch of the pipeline. Gazprom estimates that when all sections of the Yamal pipeline as well as two new compressor stations are complete, the total capacity will be 2.26 Tcf. Plans for an entirely new natural gas pipeline from Russia through Belarus and Poland to Slovakia appear to have been put aside indefinitely by Gazprom following friction between the Polish, Ukrainian, and Russian governments over the issue. There was some worry by Polish officials of damaging relations with Ukraine, because the diversion will cost Ukraine transit fees.

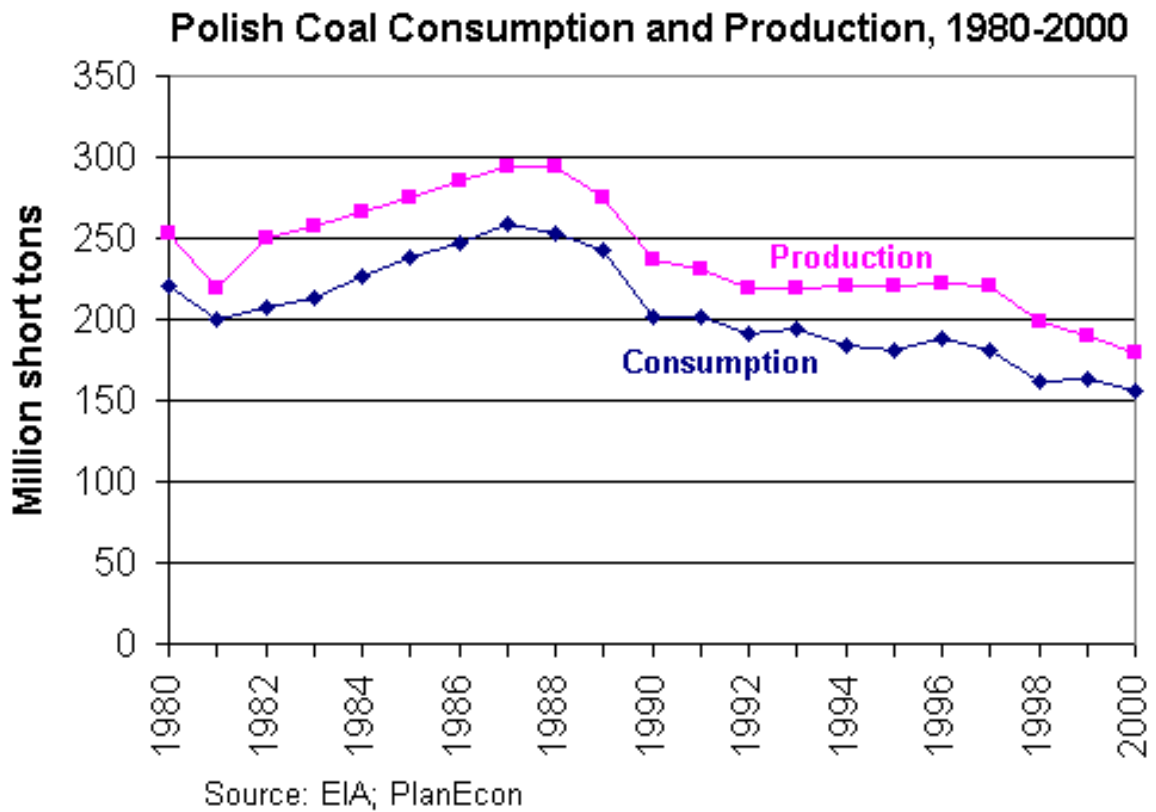
PGNiG is undertaking a program to add more than 6,200 miles to its gas distribution network by 2010. The company is also planning to invest \$670 million over the next three years to upgrade its transmission system. PGNiG is appealing a ruling by the government gas regulatory agency that the company cannot raise its rates. PGNiG believes that raising rates for some customers is vital to its restructuring.

## Coal

Although coal represents only 2% of Poland's total GDP, it is by far the dominant fuel in the country's economy, accounting for 95% of primary energy production in 2000. Polish coal, though of high quality, has various geological features that make it difficult to mine. Hard coal (mostly bituminous) provides about 65% of electricity generation, with brown coal (lignite) providing nearly all of the rest of the fuel consumed in Poland's power plants (many of which provide heat and hot water as well as

electricity). Poland is the world's ninth-largest coal exporter, with coal going primarily to customers in Europe and the former Soviet Union. These exports historically have represented a major source of foreign exchange.

There are currently seven state-owned coal holding companies. They are: Bytomska Spolka Weglowa (six mines); Rudaska Spolka Weglowa (4); Gliwicka Spolka Weglowa SA (5); Katowicki Holding Weglowy (9); Nadwislanska Spolka Weglowa (5); Rybnicka Spolka Weglowa (5); and Jastrzebska Spolka Weglowa (5), for a total of 39 operating mines. Weglokoks is the country's largest coal exporter. The company was created in 1993 as the successor to the state-owned coal monopoly; it is owned by the State Treasury. The other coal exporting company is Kopex, which may merge with Weglokoks in the future.



Coal Yards at Port of Gdansk

In May 1998, Poland announced a comprehensive restructuring program for its coal industry aimed at maximizing efficiency and paying off some of the industry's \$4.5-billion debt. Before Poland's democratization, the industry had been heavily subsidized. In 2000, Poland closed 22 coal mines and partially closed seven others, with about 16,000 miners leaving the industry. This reduced production by about 10.3 million metric tons (11.4 million short tons), but the coal mining industry became profitable for the first time, and has continued to be profitable in 2001, though this has been attributed to a write-off of part of the industry's debt. Production rose very slightly, 0.5%, to 103.9 million metric tons (114.5 million short tons).

Privatization of Polish coal mines is just beginning, with the Bogdanka mine, one of Poland's most profitable, approved for a 45% sale to Management Bogdanka, a private company that is a consortium of investors. The fully private Jadwiga mine in Zabrze is expected to begin functioning February or March 2002. PricewaterhouseCoopers is

advising the Ministry of the Economy on further privatization and restructuring, and three tentative plans have been drawn up that vary in the degree that the size of the sector that is maintained and the degree of subsidies and privatizations that would be put in place. A new plan proposed by the current government would create a new holding company called Polish Coal (PW) that would take over the shares of the seven state-owned companies and act as the manager until the coal sector is fully privatized. Another aim of this plan is to control the price of coal in Poland so as to avoid regional disparities that make imports cheaper in some parts of the country. It is estimated that various mining reform programs will cost \$2.26 billion through 2006.

The changes brought about by the coal restructuring program have had some positive economic and environmental implications, which are important for Poland's accession to the EU. Despite this, Polish coal miners have been extremely resistant to the changes, and have held protests and strikes in opposition. The Polish coal industry is one of the country's most important employers and has a powerful union, so there are important political considerations to all reforms of the sector, as well as commensurate efforts to find employment for displaced miners.

## **Electricity**

With installed electric capacity of over 30 million kilowatts in 1999, and electric generation of 134 billion kilowatt hours (bkwh), the Polish power generation sector is the largest in Central and Eastern Europe. As noted above, most of Poland's electricity comes from coal-fired plants, which are highly [polluting](#) and operate with outdated technology. The Polish government expects electricity demand to grow by over 50% by 2020. Poland produces more electricity than it consumes and exports the excess to neighboring countries. Polenergia, a new company, was established by Polish grid operator PSE, a German distributor, and a private Polish company, to sell privatized electricity, including electricity from Russia, to Western European markets.

Poland's electricity is produced by a combination of independent power producers that sell to the state-owned grid operator PSE SA, as well as by PSE itself. There are 17 power plants and 19 power and heating (CHP) plants. PSE transfers power to 33 local distributors, of which the G8 Group is the largest. PSE is in the process of initiating an hourly balancing market for Poland. There has been some consolidation of producers, the most important of which is Poludniowy Koncern Energetyczny (PKE) with total capacity of 4,640 MW. It is expected that only consolidated producers will be able to compete with Western companies as the Polish market continues to open.

Poland's status as an EU applicant makes it more important that efficiency and environmental goals are met in a timely fashion. In November 1998, Poland ambitiously committed to adapting its electricity market regulations to EU standards within four years. Renovation of the sector is expected to cost about \$15 billion by 2010. For these reasons, Poland's power generation is in need of investment. Multilateral lending institutions, most notably the World Bank and the European Bank for Reconstruction and Development, are involved heavily in financing and participating in projects ranging from building new, non-coal facilities to providing cleaner technologies for existing coal-fired plants.

Privatization is seen as the key to modernization and efficiency of the electricity sector. In September 1996, a law was passed that laid the foundation for de-monopolization and privatization of the industry. Plans called for reducing the number of generating companies from 35 to 7 and for privatizing power generation by the end of 2001. A law that took effect in December 1997 sets the groundwork for third-party access to the power grid and vests authority in an independent Energy Regulatory Office. However, the privatization has been delayed. According to the head of the Energy Regulatory Office, it will be two to four years until Poland's energy market is truly competitive. Outstanding long-term supply contracts between power generators and the national grid company, PSE, need to be resolved before market pricing can take effect. Currently, companies consuming more than 40 gigawatthours (GWh) of electricity annually can legally choose between suppliers, but this has yet to be fully implemented. Regulations are still seen as insufficiently defining PSE's position in the new system, such that as PSE continues to regulate itself, the opening up of the grid is restricted.



Electricite de France (EdF) is one of the larger investors in the Polish electricity sector thus far. It has a 57.9% share of the El. Krakow CHP plant and a 11.5% share of the ZEW Kogeneracja CHP plant. Working with Gaz de France, EdF in June 2000 won a tender to buy a 45% stake of the cogeneration company Zespól Elektrociepłownia Wybrzeże (ZEcw), which serves Gdansk. EdF already owns a controlling stake in Elektrociepłownia Krakow, serving Krakow, and a smaller stake in a cogeneration group in Wrocław. In November 2001, EdF's Zecw Group in Poland and Dalkia, a subsidiary of French multinational Vivendi, reached an agreement to purchase 45% of two thermal electric power plants at Toruń. EdF is looking to invest in the distribution side as well. Sweden's Vattenfall has already invested in the distribution side, owning 32% of the large southern GZE distribution group as well as 55% of Warsaw's district heating plant in Siekierki. Vattenfall plans to gain majority shares as soon as possible. Belgium's Tractebel recently acquired a 25% stake in the Polaniec power plant, which is Poland's fourth-largest power generator. In August 2001, the Polish government granted Spanish utility Iberdrola the exclusive right to negotiate the acquisition of 25% of the G8 Group electricity distributor. In southern Poland, a new coal-fired plant is under construction by a subsidiary of U.S.-based PSEG. This will replace the Chorzów plant, now over 100 years old. American utility PSEG signed a deal to purchase 35% of the Skawina power plant for \$24.8 million in January 2002. PSEG plans to invest \$56 million in the plant, part of which will be used to make the plant compliant with stricter environmental regulations.

## Environment

As the transition to democracy proceeds in Poland, [environmental issues](#) have become increasingly important. During the 1980s, Poland was one of the most polluted countries in Europe, and while democratic reforms have brought about reductions in the level of [air pollution](#), there remains much room for improvement. In fact, as Poland negotiates with the European Union (EU) for membership, the EU has spotlighted Poland's environmental record, making the country's accession to the exclusive group contingent on improvements in Poland's environmental record.

Similar to the pattern seen in other transition countries, Poland's [energy consumption](#) has decreased in the past 10 years as inefficient factories and industries were closed down. However, unlike the majority of the former Eastern Bloc, production has rebounded in Poland. Although the country's [carbon emissions](#) have dropped since 1989, Poland's dependence on coal, along with the explosion in private automobile use among Poles, correlates to high levels of [energy and carbon intensity](#) in Poland.

Poland's [renewable energy](#) sector is small, with only a few hydroelectric power plants. However, as Poland enters the [21st century](#), the country is beginning to shift away from non-ecological coal mining and related industries towards a more service-oriented, less pollution-intensive economy. In November 2001, Poland's Southern Energy Concern (PKE SA) announced plans to start up two 12-MW wind farms on the coast and in the southern mountains.

## CZECH REPUBLIC



The Czech Republic saw its second straight year of positive economic growth in 2001 following three years of recession. The country's real gross domestic product (GDP), which had been in decline since 1997 following an economic boom during the mid-1990's, rose 2.9% in 2000 and 3.5% in 2001. Growth forecasts for 2002 have been cut back to 3.3% because of continued low demand for Czech exports in the European Union (EU) as growth there has remained slow. Trade with the EU represents about 69% of the Czech Republic's overall foreign trade. The Czech Republic is highly dependent on trade, with exports of goods and services being about 70% of GDP. Increasing exports are making a substantial contribution to growth, but imports have increased even faster, so that the current account deficit is estimated to have increased by \$1.1 billion from 2000 to 2001. Foreign direct investment in the Czech Republic peaked in 1999 at \$4.9 billion, and remained high in 2000 at \$4.6 billion, but declined in 2001, with just \$2.3 billion invested in the first three quarters of the year. The slowdown in exports has widened the current account deficit to about \$2.9 billion, though there is a surplus in the capital account that makes this sustainable.



Since the end of the Communist era in 1989, when 100% of industries were state-owned, the Czech Republic has made great progress in privatization. It is estimated that only 10% of Czech industry was state-owned at the start of 2001. The government has plans for further privatizations in the chemical, energy and mining, telecommunications, and steel sectors. The structural reforms and economic rebound have strengthened the Czech Republic's fast-track status for membership in the EU, which is currently slated for 2003-2005.

The Czech Republic's unemployment figure, at about 8.5%, is about the European average, is expected to remain steady over the next two years. In late 2001, growth in industrial production began to slow in response to falling demand in key foreign markets, especially Germany, though domestic demand remains fairly strong. Czech inflation is low, falling to an annual rate of 4.1% in December 2001.

Following an October 1999 European Commission report which warned that the Czech Republic was lagging behind other so-called "firstwave" countries in the introduction of European Union (EU) laws and structural reforms, the opposition Civic Democrats and the ruling Social Democrats (the country's two major parties) agreed to make approval of EU legislation a priority and to speed up the pace of reforms and the stalled privatization process. One issue to be dealt with for the Czech Republic's accession to the EU is the need for further restructuring of the country's energy sector and the end of energy subsidies. The energy chapter was included in the accession talks between the Czech Republic and the EU in November 1999, and while the Czech Republic applied for a phase-in period that would postpone full liberalization of its electricity market until 2005 and of its natural gas market until 2008, the EU called on the Czech Republic to look for ways of re-evaluating its application. In addition, it is estimated that achieving environmental compliance with EU standards by 2004 will cost about \$15 billion. The Czech Republic became a member of the International Energy Agency (IEA) in 2001.

The decision in October 2000 by Czech authorities to activate the controversial, Soviet-era Temelin nuclear power plant in southern Bohemia led to a diplomatic confrontation with neighboring Austria, which argues that the plant is unsafe. A compromise was reached between Austria and the Czech Republic that allowed EU inspectors to assess the plant in December 2000, before it began operating commercially. In November 2001, the premiers of Austria and the Czech Republic came to an agreement to make certain bilateral duties in regards to the Temelin plant part of the Czech Republic's accession process to the EU in return for Austria not blocking the Czech Republic's accession. The other members of the EU must agree to this unusual step of having a protocol attached to the accession treaty. (See Electricity section for more on the Temelin plant.)

## **Oil**

The Czech Republic has very limited oil reserves, and therefore relies almost exclusively on imported oil for its consumption need. Domestic oil production, which is extracted by the firm Moravske naftove doly (MND), reached 6,400 barrels per day (bbl/d) in 2001. In January 2002, Czech oil company Ceska Naftarska Spolecnost made a discovery at its Breclav block in southern Moravia, near the Vienna Basin. Oil is flowing from a test well, but estimates of production from the field are not set yet. Also in January, Australian-based Carpathian Resources discovered a natural flow of crude oil at its Postorna 1 Well in the Vienna Basin.

Czech oil consumption, which totaled 172,000 bbl/d in 2001, is projected to remain about the same in 2002. Oil imports are piped primarily from Russia, via the Druzhba pipeline, and Germany, via the Mero pipeline, which allows the land-locked Czech Republic to import crude oil from the Italian port of Trieste via the Trans-alpine pipeline network.

The Druzhba pipeline, with a capacity of 73 million barrels per year (200,000 bbl/d) to the Czech Republic, historically has been the source of the majority of the country's foreign oil. The completion of the Mero pipeline, which has the same capacity as the Druzhba, allows the Czech Republic to reduce its reliance on Russian oil. As the country continues to re-orient its economy to the West, imports of oil from Russia are declining while oil imports from the EU are rising. Overall, however, the Czech Republic's desire is to reducing its dependence on oil imports by reducing its consumption. High world oil prices in 2000 meant that the Czech Republic's increase in oil imports was slight in 2000, but imports may increase more in 2001 due to relatively lower world oil prices. In April 2001, the EU agreed to the Czech Republic's request to extend the transition period for building a 90-day state oil reserve until December 2005. Mero CR, which operates the Czech oil pipelines, is constructing three storage tanks, each with a capacity of 786,000 barrels, as part of the plan to raise reserves to comply with the EU directive. Completion is expected in 2004.

## **Refining**

The Czech Republic has two major refineries, at Litvinov and Kralupy. The refineries, which have been privatized and are now owned and operated by Ceska Rafinerska, have a combined capacity of 178,000 bbl/d. These refineries supply slightly less than 50% of the gasoline and diesel market in the Czech Republic. Ceska Rafinerska is owned by holding company Unipetrol, which is 63% owned by the government. There are four companies that are still competing for the 63% government share when full privatization occurs, which is expected sometime in 2002. Ceska Rafinerska began producing gasoline and diesel fuel from a new, czech koruna-8-billion cracking unit at Litvinov in April 2001. The added capacity will raise the production of light products, mainly petrols and diesel oil, while the production of heavier fuel oils, the demand for which is decreasing, will be reduced. Ceska Rafinerska sold about 1.1 million barrels of processed fuels to Poland in 2000, and plans to export about 1.9 million barrels in 2001.

There also is a smaller refinery in Pardubice owned by Paramo, A.S. It has a capacity to refine about 20,000 bbl/d.

## **Natural Gas**

As the Czech Republic strives to meet EU membership criteria, natural gas is becoming increasingly important to the country's energy mix. With the need to improve its environmental conditions, the Czech Republic is turning to cleaner-burning natural gas for its energy needs rather than coal. As a result, natural gas consumption has increased by 30% since 1993, from 259 billion cubic feet (Bcf) in 1993 to 337.3 Bcf in 1999. The Energy Regulation Office (ERU) has announced that household natural gas prices will rise 5%-10% in January 2002.

The Czech Republic relies almost exclusively on imports for its natural gas consumption (approximately 98% of consumption). Most of the limited domestic gas production that does occur is carried out by a British company, Ramco Energy's Medusa Oil & Gas, near the Austrian border. MND also extracts a small amount of natural gas. The vast majority of gas consumed is imported from Russia. According to the Czech Statistical Office, in 1999 the Czech Republic imported approximately 78% of its natural gas from Gazexport, Russia's Gazprom subsidiary, with about 15% of its gas coming from [Norway](#), 6% from Germany, and only about 1% from Slovakia. The percentage coming from Norway is expected to increase in the coming years, at the expense of Russian exports.

Transgas, the major gas utility in the Czech Republic, is responsible for purchasing natural gas for Czech consumption. Although the Czech natural gas industry was restructured in 1994, Transgas remained state-owned and operated until January 2002. On January 29, 2002, the National Property Fund of the Czech Republic and RWE Gas of Germany signed a contract for the sale of 97% of the shares of Transgas for koruna 117.3 billion. Transgas currently sells natural gas to eight regional gas distribution companies, the largest of which is Jihomoravska Plynarenska in southern Moravia. For an additional koruna 16 billion, RWE has acquired shares between 46% and 58% in these regional suppliers. The deal is contingent on final approval by the Czech and German anti-monopoly offices and the European Commission. RWE will become Europe's fifth-largest integrated natural gas company and the Czech Republic's largest foreign investor. Reforms have increased Transgas' profitability, from koruna 1.8 billion in 2000 to about koruna 3.8 billion in 2001. Transgas sold 346 Bcf of natural gas in 2001.

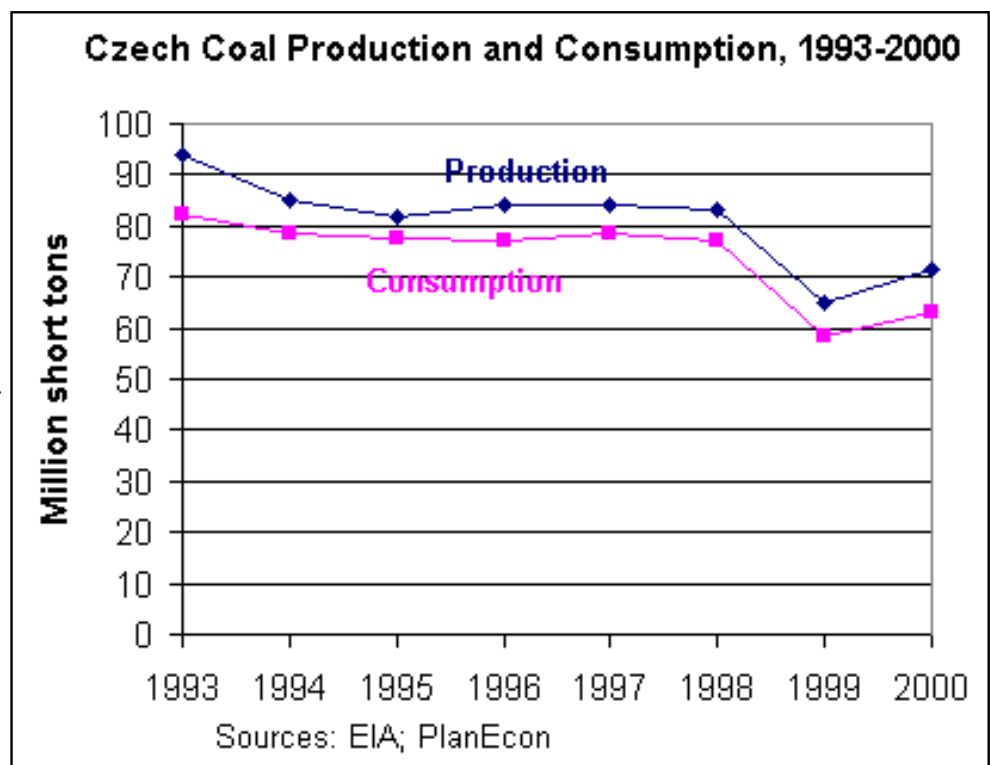
## **Pipelines**

With nearly 32,000 miles of natural gas pipelines, the Czech Republic is a major transit center for Russian gas. Transgas is responsible for transporting Russian natural gas for export to Western Europe. Natural gas is piped to two points on the Czech-German border: Waidhaus, the main point, which delivers gas to Bavaria and points west and south; and Hora Svata Kateriny, on the border with eastern Germany, from which gas travels to Berlin and northern European destinations. The pipelines have been utilized at capacity levels since 1997.

At the beginning of November 1999, Transgas concluded with Gazexport a long-term contract for the transit of Russian natural gas across the territory of the Czech Republic until the year 2020. Until the year 2008, the contract guarantees the current volume of conveyed natural gas at the level of 28 billion cubic meters per year (91.9 Bcf). After 2009, however, the contract guarantees the conveyance of only 13 billion cubic meters (42.7 Bcf) annually. The reduction is connected with the start of the Yamal gas pipeline across Poland, which bypasses both the Czech Republic and Slovakia.

## **Coal**

The Czech Republic's coal mining industry, which used to be one of the traditional pillars of the domestic economy, has experienced a thorough restructuring and paring down of activities over the past few years. The reasons behind this include a reduced demand for coal for electric power generation as the industry moves away from coal-fired power plants, the use of more environment-friendly fuels (such as natural gas) by domestic industry, and competition from cheaper imported coal. Coal mining production has fallen almost by half since 1989, and by 28.8 million short tons during the period 1993-1999. Coal's share of energy consumption has fallen to under 50% over the 1990s, to 43.9% in 1999.



A program for restructuring the Czech coal industry was approved by the government in December 1992. On the basis of this program, former state-owned coal mining companies were transformed into five large and two small commercial mining companies. In addition, the Czech government has reduced the number of inefficient mines in operation, cut the labor force associated with coal mining, and increased awareness of environmental issues related to the industry to bring the country in line with EU standards. The Czech Republic also has stated that it will accept the European Commission's decisions on coal prices in the common market.

As a result, the production of lower-quality brown coal, used mainly by power-producing and heavy industries, has been reduced significantly in the past ten years, especially the production of lignite. According to producer estimates, production of brown coal fell 12% in 2001 to 49.6 million short tons. The launching of operations at the Temelin nuclear power plant in southern Bohemia (see nuclear section, below), probably will cause brown coal mining to fall even more in 2002. Severoekse doly is the largest producer of brown coal, followed by Mostecka uhelna spolecnost and Sokolovska uhelna.

Black or hard coal, mined in particular by the Ostravsko-karvinske doly (OKD) company in northern Moravia, has also experienced a noteworthy decline, but the fall has been not as drastic, and furthermore, black coal continues to have better export markets. In 2000, OKD's production of black coal was 12.3 million short tons. In 1999, Severoceske doly Chomutov accounted for 46% of overall Czech mining production, followed by Mostecka uhelna spolecnost, with a 33% share, and Sokolovska uhelna with 21%. Of late, the domestic market for black coal has improved, and Czech industry, particularly steel, has demanded more than the import quota amount of coal from abroad.

The sharp reduction in coal mining over the last ten years has resulted in total employment in the four largest mining companies falling to less than 40,000. In comparison, OKD alone employed about 100,000 at the beginning of the 1990s. Further cuts in the mining workforce are expected.

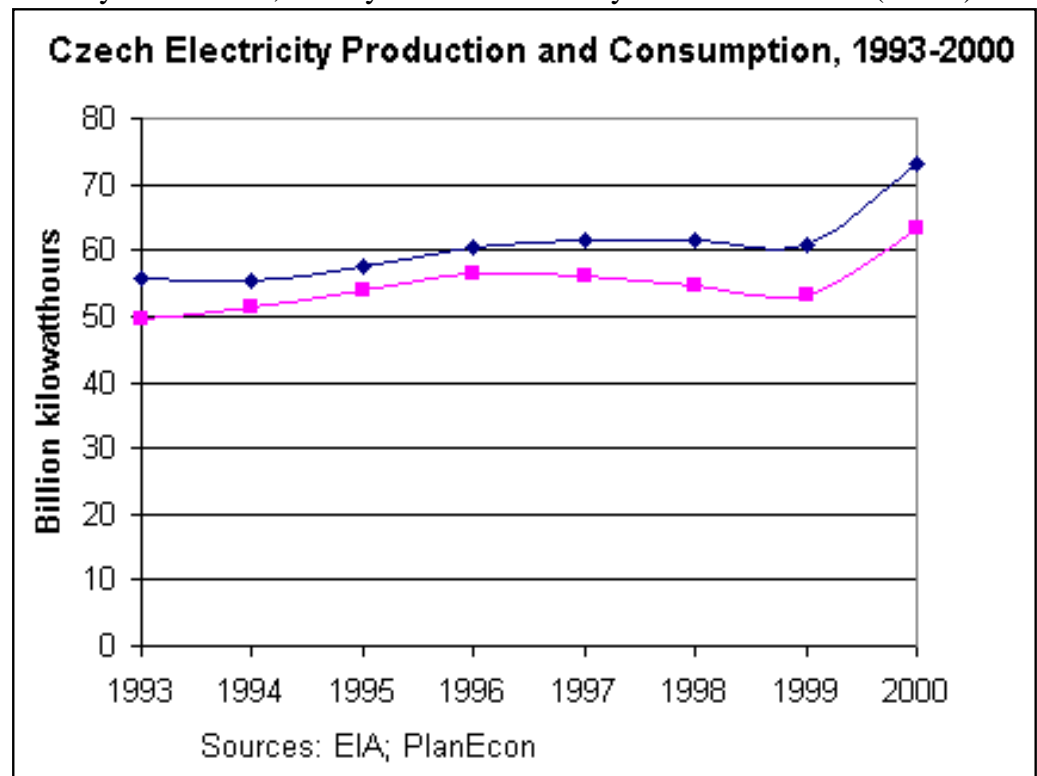
Czech coal consumption has fallen by 28% during the period 1993-1999, as the country switches to other fuels for electricity generation. Net exports of coal were 6.4 million short tons in 1999. Net exports have declined in the past few years, in part because of cheaper Polish coal exports in the region.

## Electricity

Both electricity generation and consumption generally have been rising in the Czech Republic. From 1993 to 1999, electricity production in the country rose 9.2%, from 55.6 billion kilowatt-hours (Bkwh) to 60.7 Bkwh. During the same time period, electricity consumption increased 7%, from 49.6 Bkwh to 53.1 Bkwh. By November 2001, it was estimated that the country's consumption was 68.2 Bkwh on an annual basis, though the net figure (excluding consumption of power stations) was 63 Bkwh. The country is a net exporter of electricity, with the annual amount estimated at about 0.73 Bkwh.

Ceske Energeticke Zavody (CEZ) is the Czech Republic's dominant electric power utilities company. The company produces about 70% of the country's electricity, operating 28 power plants, of which 10 run on fossil fuels, 13 are hydroelectric plants, two are wind power stations, two are nuclear power plants, and one is a solar power station. CEZ owns 10,700 MW of generation capacity in the Czech Republic, as well as the national transmission grid, which CEZ operates under control of the company's recently established, wholly-owned subsidiary Ceska Prenosova (CEPS).

In an effort to liberalize its electricity sector to conform with EU standards, the Czech Republic has attempted to privatize CEZ. The privatization of the company, which is 67.6% owned by the state, is to be bundled with majority shares in six distribution companies and total control of the transmission grid company CEPS. In January 2002, the Czech government canceled a tender for the privatization of CEZ. The government stated that the bids submitted by Electricite de France (EdF) and a consortium of Enel and Iberdrola (of Italy and Spain, respectively) failed to meet the conditions of the tender. The companies wanted certain concessions regarding purchasing of brown coal and a state guarantee for the Temelin nuclear power plant, and there were also issues with the prices offered. Another concern for the government was its ability to handle such a large influx of foreign exchange at this time when the sale of Transgas would already bring in about \$3.6 billion.



The largest heat and electric independent power producer (IPP) is Elektrany Opatovice a.s., and there are a number of smaller foreign and domestic IPPs operating in the Czech Republic. In order to enter the EU, the Czech Republic must open up 26.48% of its electricity market to competition. The Energy Act adopted in November 2000 opens up the market gradually from 2002 onward, such that 30% of the electricity market will be subject to competition by 2002, 50% by 2005, and 100% by 2006. Producers with over 10MW of installed capacity and consumers with annual consumption above 40 gigawatthours (about 60 large industrial firms) will be in a competitive market at some point this year. Additionally, subsidies for household electricity prices are to be eliminated by the year 2002, meaning that prices will rise over 10% in January, as announced by regulatory agency ERU recently. However, prices for transmission and distribution services will continue to be regulated by the state due to their monopoly character. Another objective is to increase the share of renewable resources in overall electricity consumption from the current



1.7% to 3%-6% by the year 2010.

Electricity export have become increasingly important for the Czech Republic over the past few years, peaking in the first six months of 2001, when the country exported 6.69 terawatt-hours of electricity. The majority of the electricity was imported by Germany. However, since then exports to Germany have fallen by over 30% as German utility E. On canceled its contract with CEZ on July 1, 2001, due to concerns about the Temelin nuclear power plant and pressure by environmentalists over cheap electricity from polluting power plants being "dumped" on the EU. However, E. On has signalled that it may again become a buyer of Czech electricity by purchasing only non-nuclear-produced electricity. In November 2001, CEZ, along with coal producers Severoceske Doly, Mostecka Uhelna Spolecnost, and Sokolovska Uhelna, and trading company Carbounion Bohemia, formed a new company called Coal Energy that will be essentially a marketing company for CEZ's coal-produced electric power. Coal Energy is looking to expand electricity exports to Serbia, Romania, Slovenia, and other Balkan countries.

## **Nuclear**

The Czech Republic has two operable nuclear power plants, at Dukovany and Temelin. Both are of Soviet design. The plant at Dukovany is equipped with four, 408-MW generators of the relatively new (1980s vintage) VVER-440-213 pressurized water reactor design. Dukovany provides approximately 20% of total Czech electricity output.

After years of delay, the controversial Temelin nuclear power plant, located just 30 miles from the Austrian border in southern Bohemia, was cleared for operations by the Nuclear Safety Authority on October 9, 2000. Although the plant is of Soviet design, Westinghouse was contracted to bring the plant up to Western safety standards during its construction. It consists of two VVER-981V320 generators, each with a capacity of 890-MW. The first reactor was connected to the national grid in December 2000, but was shut down in May 2001, because of circuit and turbine problems and remained closed to allow an EU inspection team time to assess the plant's safety. In August 2001, the EU inspection team found some minor flaws that could be remedied, but declared the plant safe. The first reactor was restarted, but shut down again within a week due to technical problems. Workers claim that the technical problems are not associated with the reactors, hence the plant is safe. The first reactor is currently undergoing tests and its trial operation is expected to be launched in spring 2002. The second reactor is expected to be launched in the beginning of 2003. When the plant is fully operative, it will provide over 20% of the Czech Republic's power needs.

Temelin has been controversial since construction first began in 1986. Opponents have argued that the plant is unnecessary, noting that the Czech Republic already produces more electricity than it consumes, and that additional electricity can be generated by improving the existing distribution network rather than installing new generating capacity. Critics have also accused CEZ of offering to supply energy to other countries at prices that are below production costs (dumping), a practice CEZ has publicly denied.

Although CEZ has stated that Temelin meets and even exceeds EU safety standards for nuclear power plants, Czech and Austrian environmentalists who oppose the project have accused CEZ of failing to conduct adequate safety checks. Ironically, one argument in favour of Temelin is an environmental one; specifically, that it will relieve the northern Czech Republic, whose aging coal-burning stations and extensive strip mines have turned the area into one of Europe's most polluted regions, of continued environmental degradation.

The Czech government is eager to privatize Temelin when it sells its shares in CEZ.

## **SLOVAK REPUBLIC**

Slovakia, unlike the country it was formerly joined with, the Czech Republic, has experienced significant political difficulties in its transition from a Communist state to a market economy seeking to join the European Union. The leader of Slovakia after its dissolution from the Czech Republic in 1993, Prime Minister Vladimir Meciar, was accused during his term of office of thwarting democratic principles and imposing a biased election law. However, the election of Mikulas Dzurinda as Prime Minister in 1998, and Rudolf Shuster as President in 1999 began an era of increasing democracy and integration with the rest of Europe and the possibility of EU and NATO membership. New parliamentary elections are set for the autumn of 2002.



The government began a structural reform program in 1999 that aims to privatize several state-owned companies, control the budget deficit, and reform the healthcare and social security pensions systems. The government has had some success, with budget deficits of 5% of GDP during the Meciar era reduced to 3.7% in 2001 and targeted for 3.5% or less in 2002. Proceeds from privatizations in the steel, energy, telecoms, and financial sectors have also helped reduce the deficit. After growth rates of 1.9% in 1999 and 2.2% in 2000, growth finally went above 3% in 2001 to 3.1%. Slovakia needs solid economic growth to reduce its high unemployment rate, one of the highest in Europe at about 17.5%, but as high as 40% in some areas of eastern Slovakia.

A possible drag on Slovakia's growth in 2002 is continued low growth in the EU, and particularly in Germany, Slovakia's most important trading partner. Trade accounts for about 76% of Slovakia's GDP, and Slovakia's trade deficit grew substantially in 2001, with exports declining 3.7% and imports rising 6.5%. Slovakia's trade deficit has been sustainable because of substantial inward investment flows, but it is unclear whether they will continue. Another drag on the economy has been the recent collapse of BMG Invest, an investment scheme that had 200,000 investors who will most likely not be compensated for their losses.

Slovakia closed the energy chapter of its EU accession talks in November 2001. The country agreed to close the two oldest of four blocks at the Jaslovské Bohunice nuclear power plant. The Economy Ministry sets energy policy.

## **Oil**

Slovakia's oil production is the smallest of the four countries in the Visegrad Group, with production of only about 1,000 bbl/d in 2001. This is an increase over the previous year, with most of the gain coming from Nafta Gbely's Gajary Baden reserves in western Slovakia. Nafta Gbely is one of 18 members of the Nafta Group, Slovakia's oil and natural gas extraction company. Slovakia is a small oil consumer at about 72,000 bbl/d in 2001, and is nearly completely dependent on imports.

Slovakia imports its crude oil from Russia through the Druzhba (Friendship) and Adria oil pipelines. These pipelines have a capacity of about 422,000 bbl/d, but have not been used at full capacity. Transpetrol, the operator of the pipelines in Slovakia, transported about 187,000 bbl/d in 2000, of which about 106,000 bbl/d went to Slovnaft's refinery in Bratislava and the rest was shipped onward to the Czech Republic. Slovnaft is Slovakia's only refinery, and it has a capacity of 115,000 bbl/d. Slovnaft is 36.2% owned by MOL of Hungary.

In December 2001, the Slovak government approved the sale of a 49% stake with managing powers in Transpetrol to Russia's second-largest oil producer, Yukos. Yukos was chosen over domestic company Slovnaft. Yukos plans to use the pipelines' available capacity to supply more oil to western Europe, in particular to Germany through the Druzhba and to Croatia's coast for shipment to Mediterranean countries through the Adria. The Adria pipeline connects to Croatia through Hungary.

### **Natural Gas**

Slovakia, though a very small producer of natural gas, is very important as a transit country. It is estimated that about 25% of the natural gas consumed in western Europe transits through Slovakia. This represents about 70% of the Russian natural gas exported to western Europe. Slovakia produced only about 7 Bcf of natural gas in 1999. However, the country's per capita natural gas consumption was the highest amongst the Visegrad Group countries, as about 80% of Slovak households are connected to the natural gas network. Slovakia's state-owned natural gas monopoly, Slovensky Plynarensky Priemysel (SPP) plans to invest 1.643 billion crowns for additional gas mains in 2002 to connect additional households. In March 2001, a consortium of Gaz de France (GdF), Ruhrgas, and Gazprom submitted a 49% stake in SPP, which is being reviewed by the state's privatization committee. However, ruling Party of the Democratic Left leader Pavel Juncos has since declared that a 49% stake could not be sold for the \$2.69 billion offered, but only a 34% stake. It is reported that the Slovak cabinet has agreed to the consortium's offer, but this has yet to be officially announced.

There are two major natural gas pipeline routes in Slovakia. Both receive natural gas from Russia via Ukraine; one transits onward to the Czech Republic and Germany, the other transits to Austria. The pipelines' Slovak sections are operated by SPP. The pipelines deliver about 3.18 Tcf per year to Western Europe. There are plans to build an extension of the Yamal II natural gas pipeline that would bypass Ukraine and instead transit Belarus and Poland to Slovakia. The planned 373-mile pipeline, 72 miles of which would pass through Slovakia, would have a capacity of 1.06 Tcf per year.

Slovakia's natural gas market is to be liberalized (i.e. customers will be able to choose their supplier) in stages, with liberalization beginning July 2002 for customers with an annual consumption of more than 882 million cubic feet (25 million cubic meters), in 2003 for customers with an annual consumption of more 530 million cubic feet (15 million cubic meters), and in 2008 for customers with an annual consumption of more than 177 million cubic feet (5 million cubic meters).

### **Coal**

Slovakia's coal reserves and production are much smaller than that of the other members of the Visegrad group. Slovakia's coal reserves are estimated at just 190 million short tons, all of which is subbituminous and lignite. Most of the coal is used for electricity production. Production was about 2.5 million short tons in 1999. There are three coal mining companies in Slovakia, all of which are privately owned, and almost all the coal they produce is brown coal. The largest is Hornonitrianske bane Prievidza (HBP), with about 64% of all coal sales. Its main customer is Slovakian electricity company Slovenska Elektrarne (SE), however, HBP has plans to build its own coal-fired power station. The other two companies are Dul Dolina (also known as Bana Dolina) and Bana Zahorie.

### **Electricity**

In 1999, Slovakia's installed electric power generating capacity was about 7.8 million kilowatts, about the same as that of Hungary, despite Slovakia having a smaller population. Slovakia's generating capacity is diversified, with coal, natural gas, hydro, and nuclear power plants each having less than a third of overall capacity in 1999. With two nuclear reactors coming on line in 1998 and 2000, Slovakia has become more reliant on nuclear generation and less reliant on coal and fuel oil (mazut) for electricity generation. Slovakia still has substantial unused hydroelectric

potential. Slovakia generated about 22.6 Bkwh of electricity in 1999, and it is estimated that this total increased in 2000 and 2001. SE alone, which supplies about 85% of Slovakia's electricity, is estimated to have generated about 24.9 Bkwh in 2001. Slovakia was a small net electricity importer in 1999, but it is estimated to have become a net exporter in 2001, as preliminary estimates of electricity consumption in 2001 are about 26.9 Bkwh.

SE is Slovakia's dominant electric power company. It is state-owned, but it is likely to be partially privatized after undergoing organizational and financial restructuring. The government acknowledges that this restructuring will not be completed before the September 2002 elections. SE generates about 85% of Slovakia's electricity, operates the national transmission grid, and trades electricity. Distribution is carried out by three regional companies: Zapadoslovenske Energeticke Zavody (ZSE), Stredoslovenske Energeticke Zavody (SSE), and Vychodoslovenske Energeticke Zavody (VSE). The government has issued tenders for 49% stakes in these companies, and several foreign firms have expressed interest, including CEZ of the Czech Republic.

On January 1, 2002, consumers of more than 100 gigawatthours (Gwh) were supposed to have been allowed to choose their supplier. This covers about 19 large companies that represent some 28% of the market. This liberalization was postponed by the Economy Ministry, however, because an independent electricity regulating agency has not yet been formed and the restructuring of SE is incomplete. Liberalization for customers using more than 40 Gwh is scheduled for 2003, and complete liberalization for 2007.

## **Nuclear**

Slovakia has two nuclear power plants, which generated an estimated 59% of Slovakia's electricity in 2001. All of Slovakia's functioning reactors use the VVER-440 V213 Soviet design and are operated by SE. Slovakia's nuclear plants are regulated and monitored by the Slovak Nuclear Regulatory Authority (UJD). The Jaslovské Bohunice plant at Trnava has four, 408-MW reactors that are functioning, and one decommissioned reactor. The plant's two older reactors are due to be decommissioned in 2006 and 2008 as part of the energy chapter of Slovakia's accession agreement with the EU. An EU study in 1992 determined that the two older functioning reactors at the plant could not be modernized at a reasonable cost. The two newer reactors will require investment of 12.62 billion crowns by 2008 for their modernization, according to the Ministry of the Economy. The modernization is required by the UJD, the International Atomic Energy Agency (IEAA), and legislation. The Mochovce plant has two completed 412-MW reactors that went on line in 1998 and 2000 and two uncompleted reactors whose construction has been halted as government financial support for them has ended.

## **HUNGARY**

Hungary transitioned from a Communist state to a democratic one without violence and held its first free, multi-party parliamentary election in 1990 after the former parliament and Communist Central Committee made a "democracy package" of key reforms in 1989. Hungary emerged from the Communist era with one of the most advanced economies of region, but still not nearly as developed as its neighbor and former partner in the Austro-Hungarian Empire, Austria. Hungary also had significant foreign debt. The first post-

Communist government encountered problems in the transition to a market-based economy, with real GDP falling about 18% from 1990-1993. Industrial output also shrank, and the foreign debt, current account deficit, and budget





deficit rose to high levels. The new government of 1995 instituted an austerity and privatization program as well as a new export-promoting foreign exchange regime to reduce the debt and deficit levels. By 1997, the country's finances were solid and Hungary no longer requires any assistance from the International Monetary Fund (IMF), and has repaid all of its debt to the Fund.

The Federation of Young Democrats (renamed Fidesz-Hungarian Civic Party (MPP) in 1995) captured a plurality of parliamentary seats in the May 1998 elections and forged a coalition with the Smallholders and the Democratic Forum. The head of Fidesz, Viktor Orban, became Prime Minister. The current government is more nationalistic than the previous ones, and has championed the rights of Hungarian minorities living in surrounding countries. The government has also slowed the pace of liberalization in some sectors and has favored more state intervention than the previous government. A parliamentary election is scheduled for spring 2002. Hungary entered NATO in 1999 and has applied to become a member of the EU in 2004 or 2005. Hungary became a member of the International Energy Agency (IEA) in 1997

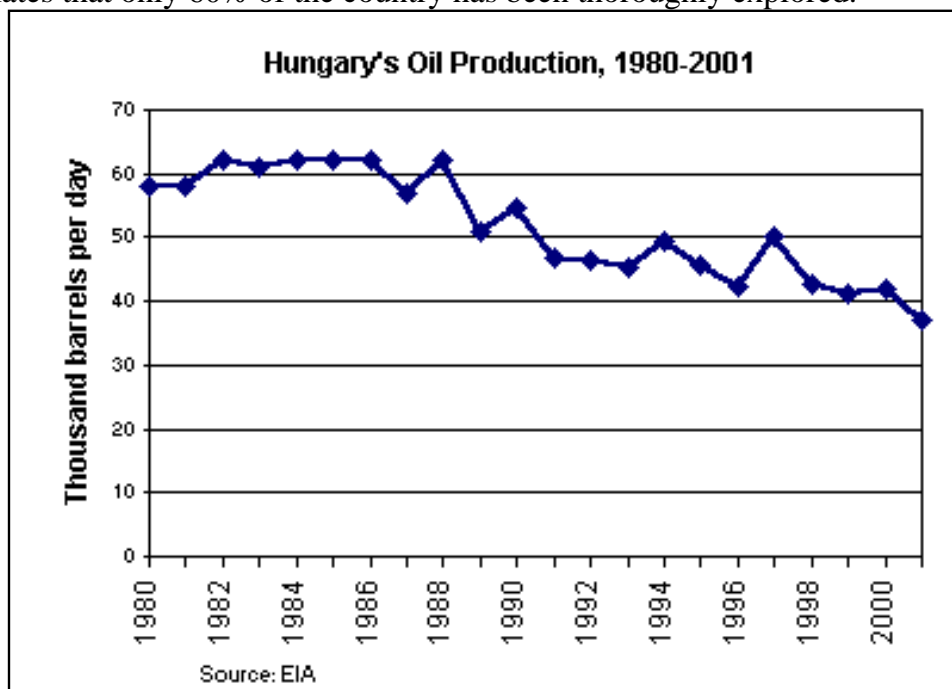
Hungary had strong economic growth of 5.2% in 2000 and this continued into 2001, with a growth rate of 3.8%, despite the global economic slowdown, especially in major trading partners Germany, Italy, and Austria. Hungary has had the strongest economy in the Visegrad group over the past three years. Hungary is dependent on exports for economic growth, and a 13% expansion in exports (especially services) in 2001 was a prime factor driving Hungary's growth and the reduction of Hungary's current account deficit to about 2.1% of GDP. Inflation began to fall in late 2001, and is predicted to be about 6.5% in 2002, the lowest level since Hungary became a market economy. The lower inflation has made it possible for the central bank to cut interest rates 50 basis points in January 2002.

## Oil

Hungary is the largest producer of crude oil among the Visegrad Group by far, though still a small producer by international standards. Crude oil production rose very slightly in 2001 to about 27,000 bbl/d, but production of natural gas liquids fell by about 5,000 bbl/d. Hungary's oil production had been declining steadily since its peak in the mid-to-late 1980s of 62,000 bbl/d. Nearly half of Hungary's crude oil comes from the Algyo field in the south central part of the country, and the remainder is produced from numerous fields with production of less than 2,000 bbl/d. Oil reserves are about 110 million barrels. Hungary's oil and natural gas company MOL has undertaken increased domestic exploration, and the company estimates that only 60% of the country has been thoroughly explored.

Hungary consumed about 146,000 bbl/d of oil in 2001, so the country is reliant on imports, mostly from Russia. Consumption has declined steadily from a peak of 244,000 bbl/d in 1980. Russian oil is imported through part of the Druzhba pipeline. A smaller amount of oil is also imported from the Middle East.

Hungarian Oil and Gas Company (MOL) is Hungary's largest company in terms of net revenue, and is dominant in the upstream and downstream oil sectors. The company is responsible for almost all of Hungary's natural gas and oil exploration and production, transmission, stockpiling and wholesale trade. It has an 82% share of the wholesale oil market and a 42% share of the retail market. It was partially





privatized through stock market flotations 1994-1998. The state retains a 25% "golden" share. In 2001 MOL merged its domestic and international upstream activities into one unit and decided to cease all oil exploration abroad with the exception of Yemen. MOL will, however, continue to acquire areas abroad where oil has already been discovered. MOL has attempted to purchase downstream assets in other central European countries, but its only successful purchase so far is a share of Slovakian refiner and retailer Slovnaft. In November 2001, MOL sold its 51% stake in oil storage firm Koolajtarolo to the Crude Oil and Oil Product Storage Association (KKKSz) for 6 billion forints.

In 2001, MOL shut down the crude processing facilities at its 60,000-bbl/d Tiszaújváros and 10,000-bbl/d Zalaegerszeg refineries as part of a cost-cutting move. The Zalaegerszeg refinery will operate as an asphalt plant and the Tiszaújváros refinery will still be used for a small amount of other processing, but the only remaining crude oil refinery in Hungary is MOL's 161,000-bbl/d Százhalombatta refinery. Retail oil products prices and trade were liberalized in the early 1990s.

## **Natural Gas**

Hungary produced about 121 Bcf of natural gas in 2000. Hungarian natural gas production has been declining steadily for many years, though domestic production still accounts for a significant share of consumption. Consumption fell slightly, to an estimated 411 Bcf in 2000 from 437 Bcf in 1999, as both domestic production and imports declined. About 80% of Hungary's natural gas imports are from Russia through part of the Druzhba pipeline. Some Russia gas transits onward to the former Yugoslavia through Hungary. The Győr-Baumgarten natural gas pipeline connects Hungary to Austria and western Europe's natural gas grid. This enables Hungary to import natural gas from GdF and Ruhrgas. Natural gas demand is expected to increase by about 20% by the end of the decade, so Hungary's natural gas imports will increase significantly in light of declining domestic production.

MOL is Hungary's only natural gas producer and importer and operates the natural gas pipelines. Natural gas distribution is the responsibility of regional companies. In addition to natural gas' use for electricity generation and industry (60% of total use), about 60% of Hungarian households are supplied with natural gas (40% of total use). Natural gas represented about 41% of energy consumption in Hungary in 1999.

MOL has been losing money for several years now, at a current rate of over \$1 million per day, or about 118 billion forints in 2001. This results mainly from government price caps, which force MOL to sell imported natural gas at a loss. In September 2001, MOL lost a lawsuit against the government in the Constitutional Court. MOL charged that the government was violating laws on natural gas pricing in forcing the company keep natural gas price increases below levels necessary to recover costs. Because of this, MOL has attempted to sell off at least part of its natural gas division. However, the government is not eager to lose control of Hungary's natural gas assets. Hence, despite the interest of several foreign companies, including a local subsidiary of GdF and Ruhrgas, the state-owned Hungarian Development Bank is in exclusive talks to acquire 100% of MOL's natural gas division, effectively re-nationalizing the company and a step backward from the liberalization occurring in the region. Prime Minister Orbán has stated that he wants price controls for natural gas to remain in place for up to eight more years.

## **Coal**

Hungary is a much smaller coal producer than Poland or the Czech Republic, and about 95% of the coal produced is brown coal (including lignite). Nevertheless, coal is an important part of Hungary's energy mix, accounting for 14.6% of energy consumption in 1999 and about 25% of electric power generation. Coal's share is declining, however, and is expected to continue to do so in the next ten years. Hungary produced about 15.6 million short tons of coal in 2000. This is down sharply from about 22.4 million tons produced in 1989, at the end of the Communist era. This reflects a decline in certain energy-intensive heavy industries as well as closures of unprofitable mines that occurred in 1990s as the industry privatized. In addition, domestic lignite with high sulphur content has caused air pollution, and a new coal-fired power plant being built will use imported Russian coal. However, Hungary's lignite (about 85% of reserves) is

inexpensive to produce through open-pit mines in the Matra and Bukk mountains, so there will continue to be a demand for it at older electricity generating plants. Hungary's coal consumption in 2000 was about 16.1 million short tons, down sharply from 25.3 million short tons in 1989.

## **Electricity**

Hungary's electricity sector, like others in the region, is undergoing a process of liberalization and restructuring. Most of the sources of Hungary's capacity and generation are thermal, though Hungary's 4-unit nuclear plant at Paks generates slightly less than 40% of total electricity generated. Hydropower generates less than 1% of Hungary's electricity. It is estimated that Hungary generated about 34.9 Bkwh in 1999 and consumed about 33.5 Bkwh in 1999. Consumption peaked at 37 Bkwh in 1989, but declined in the early 1990s as Hungary's post-Communist economy grew less energy-intensive. Electricity consumption has since increased, but at less than the rate of economic growth. The Hungarian government predicts that electricity consumption will grow an average of 1.45% per year this decade, assuming 5% economic growth. According to the Hungarian government, power generating capacity currently exceeds consumption by about 30%. Nevertheless, Hungary is a net importer of electricity, mostly from Slovakia. Preliminary estimates of 2000 production show it declining, but 2000 consumption was steady, so electricity imports rose in 2000. The electricity sector accounts for about 4% of Hungary's GDP.

For years, the state-owned Hungarian Electricity Works (Magyar Villamos Muvek - MVM) generated most of Hungary's electricity, was the sole importer/exporter, and owned and operated the national electricity grid through subsidiary Mavir. This has changed, however, as Hungary's eight generation companies were unbundled from MVM over the past few years, and Mavir was acquired by the Ministry of Economic Affairs in February 2002, with the state privatization agency APV exercising ownership rights. In return, MVM is to be compensated financially by the government and by APV handing over stakes in a number of power plants to MVM. However, this may be problematic as liberalization proceeds, as no generator will be able to hold more than 30% of total market capacity. MVM already owns the Paks nuclear power plant and the Vertes power company, which are already about 30% of capacity. The eight generating companies (seven thermal and one hydroelectric) have been partially or fully privatized, but hydroelectric power company Tiszaviz Kft will likely be returned to full ownership by MVM as part of the compensation for Mavir by APV. Tiszaviz's two hydroelectric plants are slated to be modernized later this decade. There are also independent power producers (IPPs) in Hungary, which sell their power to distributors under long-term power agreements.

MVM/Mavir has made and continues to make improvements to Hungary's electricity network. In November 2001, MVM completed a 17 billion forint, network control system that connects the system to 166 other power plants and distributors and prepares the Hungarian power industry for the planned market opening in 2003. In September, MVM announced that it plans to restart investment projects on the national grid, including an expansion of the Sandofalva-Bekescsaba powerline for 18 billion forints and an expansion of the line between the southern city of Pecs and the nuclear power plant at Paks. In May 2001, MVM (represented by Mavir) became a member of European electricity transmission system Union for the Coordination of Transmission of Electricity (UCTE) as the result of a 12-year process. Hungary's power and transmission system operates in accordance with the systems of most other European countries, providing increased security of supply according to MVM.

Hungary has passed electric power liberalization legislation set to go into effect beginning in January 2003. It will begin with large consumers (about 200-300 large industrial users with annual consumption above 6.5 Gwh) that represent about 35% of the market. The legislation still requires lower-level regulations that will specify how much electricity these large users can purchase on the open market or from abroad. These regulations will also need to specify how so-called "frozen" costs will be distributed. These are additional costs that arise from the fact that consumers in a free market are unlikely to buy all the power that wholesaler MVM has already purchased through long-term contracts and will have to be reimbursed. Additional liberalization will be phased in gradually, but must

conform with EU regulations by the time that Hungary accedes, as the country has not requested any special exemptions. New power stations were permitted to be built without long-term purchase contracts as of February 2002. Many analysts are skeptical of Hungary's liberalization plans, because Hungary's electricity producers have higher costs than outside European sources, but are protected by long-term contracts with MVM. It is unlikely that the government would simply allow many power plants to go out of business when exposed to competition. Another problem is that MVM is selling below cost to distributors because of price caps, and then being compensated by the government for losses. Currently, the government is considering allowing the large consumers to purchase no more than 50% of their electricity on the open market in 2003. Also, given the small size of Hungary's electricity market and the continuing prevalence of long-term contracts, the creation of a physical spot or short-term market may be difficult. Nevertheless, in June 2001, the European Commission announced its satisfaction with Hungary's regulation of its electricity sector and concluded that the relevant legislation is in line with EU requirements.

Hungary has several new power plants planned or under construction. Central European Steel Group of Russia plans to build a 590-MW coal-fired plant near the border with Ukraine. Higher quality Russian coal will be used as the fuel source, and the plant's construction is expected to begin by the summer of 2002. Fortum Engineering of Finland and Budapest Power Plant plan to build a 110-MW gas-fired, combined cycle power plant in the Kispest area of Budapest. The plant will also produce 120 MW of district heat. E. On of Germany's Hungarian subsidiary built and owns over 90% of a combined-cycle 95-MW power plant in Debrecen that was officially opened in November 2001. The plant is an IPP, having no long-term contract with MVM. AES of the United States has been very active in Hungary, having purchased state-owned power producer Tizai Gorup in 1996. AES at the time promised to make several hundred million dollars in investments in return for long-term contracts with MVM that would support the costs of the investments. In October 2000, AES sued the Hungarian government and MVM and canceled new investment in Hungary because it claimed that MVM had failed to agree to the contracts. In January 2002, AES reached a compromise with the government and MVM that will have MVM obligated to purchase power from AES' 860-MW Tiza II oil and gas-fired plant for 15 years and for two more years from AES' smaller coal-fired power plants, after which the two coal-fired plants will be retired. AES also agreed not to build two new power plants the company had planned. NRG Energy of the United States has also invested in Hungary's power sector, having bought Powergen of the UK's Csepel II 389-MW combined cycle gas turbine power plant in April 2001.

## Nuclear

The Paks nuclear power plant at Tolna Megye consists of four Soviet-design, second generation VVER-440/213 reactor units that each have a net generating capacity of 433 MW (the oldest unit has a net capacity of 430 MW). Paks is owned and operated by MVM subsidiary Paks Nuclear Power Plant Co. The Hungarian Atomic Energy Authority (HAEA) regulates the plant. The plant is undergoing a 60-billion-forint multiyear safety upgrade program to be finished at the end of 2002. HAEA is considering a request by the Paks Nuclear Power Plant Co. to extend the lifetime of the four reactors beyond their 30-year design lives and to uprate the power at each unit by about 10%. The four units went online between 1982 and 1987. In June 2001, an accidental fire occurred that caused the plant 1.15 billion forints in losses and 150 million forints in repairs, but the accident did not have to do with the nuclear reactor, so there were no significant safety issues raised. Hungary has bilateral agreements with the other countries of the region for notification and information sharing in the case of an emergency. The EU regards the plant as safe by Western nuclear power plant standards.

<b>Table 1. Economic and Demographic Indicators for North Central Europe</b>

Country	Gross Domestic Product (GDP), 2000E (Billions of U.S. \$)	Real GDP Growth Rate, 2000 Estimate	GDP per capita, 2000 Estimate (U.S. \$)	Population, 2001E (Millions)
Poland	158.3	4.0%	4,097	38.6
Czech Republic	50.8	2.9%	4,943	10.3
Slovak Republic	19.2	2.2%	3,555	5.4
Hungary	46.8	5.2%	4,680	10.0
Total/Weighted Average	275.1	3.9%	4,278	64.3

Source: DRI WEFA

**Table 2. Energy Consumption and Carbon Dioxide Emissions in North Central Europe, 2000**

Country	Total Energy Consumption (quadrillion Btu, 1999)	Oil (thousand barrels per day, 2001)	Natural Gas (billion cubic feet)	Coal (million short tons, all types)	Electricity (billion kilowatthours)	Energy-Related CO <sub>2</sub> Emissions (million metric tons of carbon, 1999)
Poland	3.84	431	444.6	155.3	138.8	84.5
Czech Republic	1.54	175	327.4	63.3	63.2	28.5
Slovak Republic	0.70	72	292.3	11.2	27.8	9.2
Hungary	1.07	149	411.2	16.1	38.2	16.2
Total	7.15	827	1,475.5	245.9	268	138.4

Sources: Energy Information Administration; PlanEcon

**Table 3. Energy Supply Indicators in North Central Europe**

Country	Crude Oil Reserves, Million Barrels, 1/1/02E	Natural Gas Reserves, Trillion Cubic Feet, 1/1/02E	Coal Reserves, Million Short Tons, 1999	Oil Production, Thousand Barrels per day, 2001	Natural Gas Production, Billion Cubic Feet, 2000	Coal Production, All Types, Million Short Tons, 2000	Electricity Generation, Billion Kilowatthours, 2000	Crude Oil Refining Capacity, Thousand Barrels per Day, 1/1/02
Poland	114.9	5.12	15,773	14.2	174.9	179	145.1	382

Czech Republic	15	0.14	6,809	6.4	2.9	71.3	73.1	198
Slovak Republic	9	0.53	190	1	14.1	4.1	29.9	115
Hungary	110.9	1.28	4,917	37.2	121.9	15.6	34.2	161
Total	249.8	7.07	27689	58.8	313.8	270	282.3	856

Sources: Energy Information Administration; PlanEcon

*Sources for this report include: BBC; CIA World Factbook; Czech News Agency; DRI WEFA; Economist Intelligence Unit; Financial Times; Hungarian News Agency; PlanEcon; Platts Oilgram; Polish News Bulletin; Prague Business Journal; Slovak Spectator; U.S. Department of Commerce; U.S. Department of Energy and Energy Information Administration; Weekly Petroleum Argus; World Markets Online.*

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[U.S. Department of Energy's Office of Fossil Energy, Energy Overview of Poland](#)

[U.S. Department of Energy's Office of Fossil Energy, Poland Energy Law](#)

[U.S. State Department's Consular Information Sheet - Poland](#)

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[Library of Congress Country Study on Poland](#) (October 1992)

[U.S. Commerce Department's Market Access and Compliance, Poland](#)

[U.S. Commerce Department's Market Access and Compliance, Electric Power Generation in Poland](#)

[U.S. Commerce Department's Market Access and Compliance, Profile of Polish Oil and Gas Company](#)

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File last modified: March 27, 2002

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